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47380

Radio Control CAR ACTION

THE WORLD'S LEADING R/C CAR MAGAZINE

March 1994

Pro Motor Tips

- Tuning for power
- When to rebuild
- Picking the right wind

Trinity's New Modified Motor

HEAVY HORSEPOWER

8 ways to have more R/C fun!

+

Kyosho "Hanging-On Racer" Motorcycle

R/C Thunderdrome

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CONTENTS

VOLUME 9, NUMBER 3 • MARCH 1994

Track Reports

4 **Kyosho Suzuki RGV**
by John Huber
Ultimate pocket rocket

62 **OFNA Tempo**
by George Gonzalez
Keepin' the beat

70 **Tamiya Terra Conqueror**
by Paul Onorato
Terra-ize the competition

Columns

24 **Troubleshooting**
by John Huber

56 **R/C Doctor**
by Doug Mertes

106 **Scoping Out**
by John Rist

110 **Nitro News**
by Jeff Bronstein

Racer News

36 **R/C Thunderdrome**
by George Gonzalez

86 **PROCAR Nats**
by Rick Schwartz

92 **Speed Shop**

96 **MRC/Trinity Dash for Cash**
by George Gonzalez

Departments

6 **Editorial**
by Frank Masi

8 **Letters**

10 **Pit Tips**
by Jim Newman

15 **Inside Scoop**
by Chris Chianelli

20 **Readers' Rides**

32 **What's New**

FEATURES

29 **Too Much Fun**
Spice up your R/C life! • by Tony Donaldson

53 **Trinity EX Series Modified Motors**
Team tech for everyone • by Scott Douglas

74 **Pro Motor Tips**
Expert tuning advice • by John Howell

128 **Racing Log**
Dear diary • by Garth Finley

141 **C&M/Cobra Power Feed**
Automation sensation • by Frank Masi

ON THE COVER: *R/C madness! (Photo by Tony Donaldson.) Inset: Trinity's new EX motor. This page: Kyosho's Suzuki RGV. (Photo by John Huber.)*

EDITORIAL

CHICAGO—NO JORDAN, BUT PLENTY TO TALK ABOUT

The Chicago RCHTA show, which is held annually during late October/early November, is the largest U.S. trade show for the R/C car hobby. The '93 edition was my third, and I'm pleased to say that there were more new products than I had ever seen before.

In '92, the only notable releases were in the 1/10-scale gas-powered category. This coincided with the upsurge of this segment's popularity throughout the hobby, but many manufacturers with a vested interest in the electric market proclaimed gas to be a threat to their well-being.

This most recent Chicago show was a veritable showcase of new gas *and* electric products. If current trends continue, expect to see much more realistic, electric- and gas-powered vehicles on the hobby shop shelves in '94. My show favorites in the scale category were Tamiya's new 1/10-scale desert racing trucks (finally, a Ford and a Chevy from the Land of the Rising Sun!) and Lotus Formula 1 car; Kyosho's gas-powered go-karts and Hang-On motorcycles (look for a full report in this issue); and Parma's cool 1/10-scale '29 Roadster.

A few exhibitors made their first appearance in Chicago. I was surprised to see Yokomo of Japan with their very own booth. The whole gang was there: Masami, his father Masaaki—even company president Mr. Yokoburi. For its 1/10-scale on-road 4WD chassis, Yokomo displayed several hot-looking bodies, such as a new Honda Prelude and a Mitsubishi GTO (3000GT here). KO-Propo displayed their new engine-starter systems, one of which allows you to fire your gas engine from your radio without ever having to touch the model!

All in all, if the Chicago RCHTA show is any gauge to the health of our beloved hobby, things are looking quite rosy for the future. Almost everyone spoke of high sales, and with all the new goodies, there will be plenty to read about in upcoming issues of *Car Action*. ■

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SUBSCRIPTION PRICES:
U.S. & Possessions (including APO & FPO): 1 year (12 issues) $29.95; 2 years (24 issues) $54.95. Outside U.S.: 1 year $42.95; 2 years $80.95 Payment in U.S. funds.
Subscription Inquiries: 1-800-877-5169

RADIO CONTROL CAR ACTION (ISSN 0886-1609) is published monthly by Air Age, Inc., 251 Danbury Rd., Wilton, CT 06897, USA. Connecticut Editorial and Business Office, 251 Danbury Rd., Wilton, CT 06897. Phone: 203-834-2900. FAX: 203-762-9803. Y.P. Johnson, President; G.E. DeFrancesco, Vice President; L.V. DeFrancesco, Secretary; Yvonne M. DeFrancesco, Treasurer. Second Class Postage Permit paid at Wilton, Connecticut, and additional Mailing Offices.

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LETTERS

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Letters," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

PROJECT HYPERSPEED

First of all, I love the magazine. It has lots of helpful hints, great reviews, blah, blah, blah. Well, anyway, a while back (April '92), you did a review on the Royal Hyperspeed Kawasaki motorcycle. It was a great review, and it made me go out and buy one. I have the Hyperspeed Yamaha (same bike, different body), and I've already upgraded it with a 16-turn motor, a side-mounted shock and bearings, just as it said in your review. Its speed, handling and realistic looks are more than satisfactory, but *I want more speed!* I was thinking of putting in a micro receiver, a Novak M5 and maybe a 12-turn motor. Would this be possible, or if not, what could I do? I don't care if it's practical, just possible. I hope you can help.

STEVE JONES
San Jose, CA

Well, Steve, just hold on and wait until our next issue, in which contributing author, John Huber, will take an in-depth look at the Royal Hyperspeed motorcycle and show you what he has done to modify it. JH

CHROME ZONE

Help, please! I own a Blackfoot, and I'm in the middle of modifying it, but I want a chrome chassis. I called my hobby shop, and the people there said that they couldn't buy it separately. The only way I can get it is to buy the complete chrome package. Can you help me find a chrome chassis?

JASON GRIFFITH
Williamsport, MD

Well, Jason, I'm not too sure where you can get a chrome Blackfoot chassis separately, but I do know where you can have your stock chassis chromed. Give Chrome Tech USA a call at (608) 274-9811; they should be able to help you. Compare their price with the price of the complete chrome package, and see which is easier on your wallet. JH

WHERE'S YOKOMO?

I love your magazine. Before I received my first issue, I knew nothing about R/C cars. Now, I'm putting them together! Thanks a lot. I'm interested in buying a Yokomo Works (shown in your 1993 "Top 10 Cars"). Can you help me find a store or company that carries these? I really need your help finding this superb car.

PETER LOJAC
Lindenhurst, NY

The Yokomo Works '93 is an awesome 4WD car, and you can get hold of one through Bob Stormer at Stormer Racing: (406) 228-4569; or try their toll-free order line: (800) 255-7223. JH

KING OF GAS

First, let me say that your mag is awesome. I've been reading it for two years. I'm interested in getting the Thunder King, but I want to know whether MRC plans to come out with a gas conversion for it. And will it have 4WD? Keep up the awesome work!

MITCH TITTERNESS
Lake Stevens, WA

Well, Mitch, there's good news! It looks as if MRC will produce a .21-powered gas truck. We saw one of the early prototypes at the recent Chicago Hobby Show, and it looked really awesome. It won't be a 4WD vehicle though; it will still be 2WD like the rest of MRC's World Scale lineup. I'm sure that, when the truck is available, MRC will also offer a conversion kit for the electric trucks and buggy. JH

DURATRAX LS

Does DuraTrax offer a gas conversion kit for the Eagle LS? Thanks. Great mag!

JUSTIN YANNIG
Gridley, IL

Sorry, Justin; no dice. DuraTrax doesn't

offer a conversion kit for the Blue Eagle LS, and they don't have any plans to make one. If you're a diehard Traxxas fan and you want to get into gas, why don't you check out their Nitro Hawk truck. It's one option to consider. JH

GOTTA GET GRAPHITE

I have been reading your mag for about two years. I'm working on my super project, and I need to know where I can get my hands on some sheets of graphite. I plan to make an on-road chassis for my Bolink '91 Sport. If you can help me in any way, I'd very much like it.

D. BROOKE TRISLER
Cincinnati, OH

Well, D., you might want to check with Dave Inkel of DA Graphite. Dave specializes in graphite, and he might be able to help you. You can get hold of him at (619) 562-6123. Good luck! JH

THE BRUISER IS BACK

I've recently become interested in the Tamiya Bruiser. I know that it has been discontinued, but I want to know where I can get one—used or not. Do you know of a place that sells used R/C cars?

TYSON THOMPSON
Los Altos Hills, CA

Tyson, the ever popular Tamiya Bruiser has been revamped and re-released as the Mountaineer. It has been slightly—cosmetically—updated, but it has the same basic features as its predecessor, the Bruiser. As for finding used cars, look in your local newspaper or your regional classified-ad bargain newspaper. You can usually find good deals on used equipment in there. JH

PAINT PEELER

My parents bought me an Outlaw Ultima truck for Christmas, and my dad and I put it together from scratch. We went to a hobby store and bought some paint for it, but before I even drove it, some of the

(Continued on page 91)

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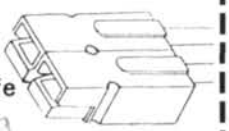

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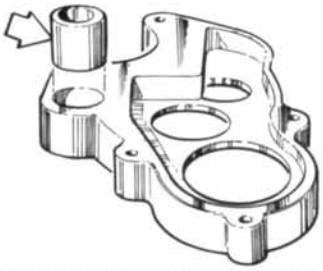
PIT TIPS

by JIM NEWMAN

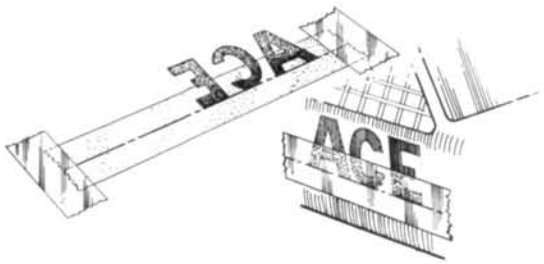


BLACKFOOT DIFF HOUSING WEAR

When the aluminum differential housing wears, it can create excess play in the rear axles. To restore the case, bore out a standard nylon bushing to 10mm i.d. (hardware stores sell them for about 20 cents apiece), and put the bushing into the case. It's that simple. *Joey Churin, Mount Vernon, NH*

ELMER'S GLUE PAINT

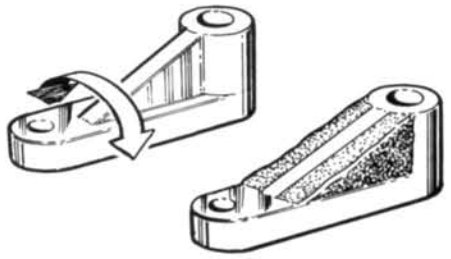
Do you like a paint scheme that looks as if the paint has run? Try this method, but keep in mind that the masking is tricky: apply a generous amount of Elmer's Glue, and let it run down the inside of the car's shell. After the glue has dried, spray on your first color; then peel off the glue when the paint has dried. Now, the car is ready for the second color. *John Demboski, Rolling Hills Estates, CA*



LETTERING ALIGNMENT JIG

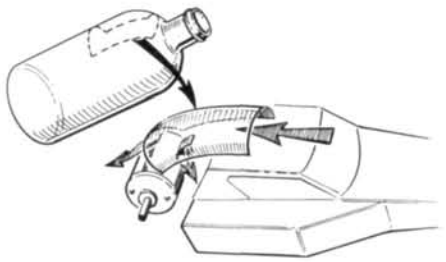
Here's an easy way to position letters: draw a line on a piece of magic tape, and fasten the tape to the bench with the adhesive side facing up. Carefully peel your letters off the carrier sheet, and place them back-to-front on the tape, lining them up on the pencil line. Pick up the tape and the letters, and carefully position them on the body. Now, press them into place. Gently peel off the tape, and burnish the letters.

M. Rommel, Prince George, BC, Canada



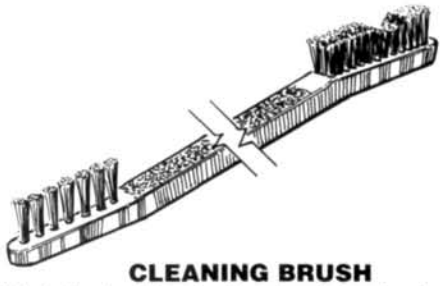
CLODBUSTER SERVO-SAVER TWIST

Those hard-to-turn big tires can put a strain on servo-saver arms and make them twist. To remedy this, first clean the arms with alcohol; then build them up with J-B WELD—an epoxy/metal compound available at hardware and automotive stores. Once the compound has cured, smooth it with a fine file or a sandpaper block. This simple procedure will produce much stronger servo-saver arms. *Henry Bartimus, Dewitt, IL*



NO-COST AIR SCOOPS

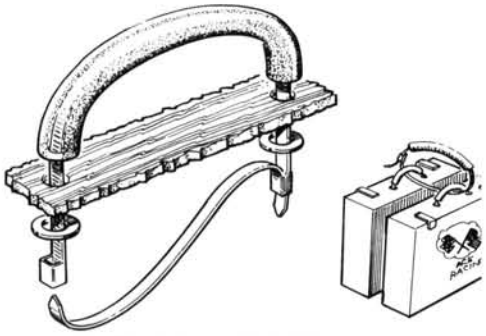
Cut air scoops out of plastic bottles as shown. They can easily be attached to the roof and the rear of the car using adhesive tape and double-sided tape. You can also attach the rear of the scoop to the underside of the wing. *Cory Crook, Taylors, SC*



CLEANING BRUSH

No, this isn't a toothbrush; it's a brush for cleaning guns. Its two types of bristle will effectively clean those hard-to-reach areas of your car. You'll find these brushes at gun shops and Army-Navy stores. *Bill Richardson II, APO*

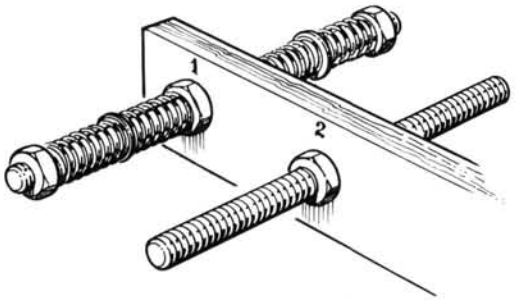
PLEASE NOTE: be sure to print your name and full address clearly on every letter and sketch you send to "Pit Tips." We can't publish many good tips because we don't have the senders' names or addresses.



TIE-WRAP HANDLES

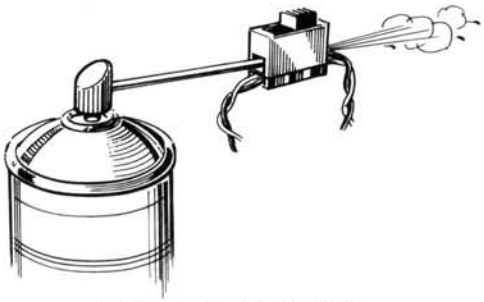
A tie-wrap makes a very tough handle for a pit box. Run one through a piece of rubber hose; then thread it through holes in the box. (Use washers if the box is made of fiberboard.) Join two tie-wraps, and clip off the excess. If you want to carry two boxes at a time, run a tie-wrap through both box handles.

Miguel Saurez, Pasores, Mexico



SUSPENSION SPRING CADDY

If you experiment with different spring rates, you probably have a lot of springs. Here's a good way to store them: drill holes in a piece of wood, e.g., a yardstick. Push pieces of 3/16-inch threaded rod through the holes, and secure them with nylon nuts on each side. You'll be able to arrange your springs in matched pairs, end to end, with a washer between them. Color-code each pair with a dab of paint; that's how they do it for full-size racecars. *Klier Robert, Lichtenau, Germany*



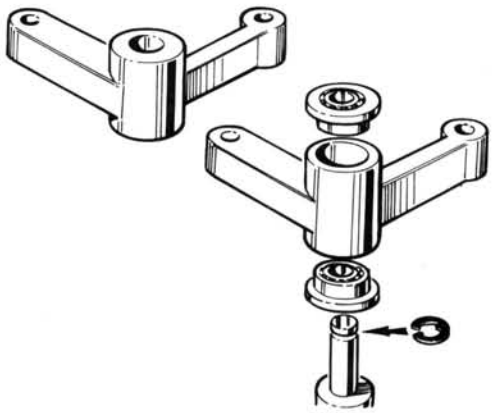
SWITCH CLEANING

When dirt gets into ESC switches, it makes them hard to move, and it wears out the contact. Once you've checked that your motor spray is safe to use on plastics, you can blast the inside of the switch. If you can't use motor spray, use Radio Shack's TV tuner cleaner. When the switch is clean, apply a little commutator lubricant. *Demick Boyden, Davis, CA*

PADDED BODY CLIPS

Body clips are easier to grasp if you slide a piece of thin fuel line over the loop. You may also use colored insulating sleeves, which make the clips easier to see if you drop them.

Darren Hamm, Mahomet, IL



REDUCE LXT STEERING SLOP

Here's an inexpensive way to improve your LXT steering: drill Losi bellcranks to a diameter of 5/8 inch, and reduce the height to about 5/64 inch. Install four Associated, flanged, wheel bearings (the ones that are used on the front wheels of the Team Car); put the cranks back on their respective posts; and refit the E-clips. Apply a drop of oil to the bearings and links, and you're finished. *Russell Eaton, Independence, MO*

NO-COST PARTS CONTAINERS

Transparent 35mm film containers and transparent plastic soup carry-out containers make ideal storage containers for parts. They're easy to stack, and you can't beat the cost.

Jack Faenza, Gillette, NJ

Radio Control Car Action will give a six-month subscription (or six-month renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o **Radio Control Car Action,** 251 Danbury Rd. Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

INSIDE SCOOP

by CHRIS CHIANELLI

Entertainment was provided by "Pepe de le Doog."

WE ALL WENT TO CHICAGO...WE THREW A PARTY...ANYBODY WHO WASN'T THERE WAS EITHER UNINVITED, UNCOOL...OR BOTH!

Parma's Colonel Edwin Frey, fraught with disgust at our behavior.

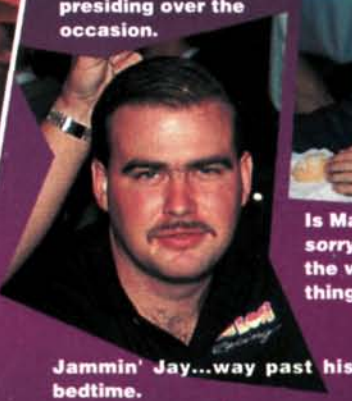
It's "Wedge-Head" Howell and our other boss—the beautiful boss—Yvonne DeFrancesco.

Big guns unload. Bruce Holocek and Louis D. presiding over the occasion.

Howdy-head Masi hitting on Akiko Kimura from MRC.

Horizon's Chris "Stan Laurel" Miksovsky charms the ladies.

Is Masami *sorry he ate* the whole thing?



Jammin' Jay...way past his bedtime.

Associated's Gene Husting beaming onto the dance floor.

The Boss leads advertising manager Sharon "Elke" Warner in a round of the bunny-hop.

These guys almost didn't get in: (from right) Brian Kinwald (too underdressed), Mike Reedy (too overdressed) and Cliff Lett (too happy).

AWARDS TIME

Every year *Car Action* presents trophies at the Chicago Show for Car and Truck of the Year. Left: this year's truck award goes to the 1/10-scale Losi LXT race truck. The Losi clan (from left): Gary Kyes, (Louis DeFrancesco presenting), Pops Losi, Moms Losi and Gil Losi Jr..

Right: Car of the Year goes to an 1/8-scale gas contender—the venerable Kyosho Inferno. Accepting on Kyosho's behalf are the charming party animal Mori Matsumoto, General Manager, Foreign Trade Dept. and Tom Grogg from Great Planes.

TAMIYA

Here's a closer look at the new Tamiya TR-15T 1/10-scale gas truck's powerplant. In this photo, we can see some—but by no means all—of the features of the new pull-start FS-15. The piston/sleeve assembly might be ABC (aluminum, brass, chrome), but it could also turn out to be ABN (aluminum, brass, nickel)—still good, but chrome is preferable. The conrod seems to have been machined out of bar stock and is definitely bronze-bushed—at least at the low end and possibly at the top, too. The large-finned head and the large squish-area combustion-chamber button also seem to have been machined out of bar stock. The carb is an air-bleed, two-needle metering system, while the one-piece crankcase holds ball bearings front and rear for the one-piece crankshaft to ride in. Overall, the engine has the right stuff!

FS-15 Glow Engine

President of Tamiya Inc., Mr. S. Tamiya (top) holds the latest Tamiya Touring Car (DTM) contender—the Alfa Romeo 155 V6 Ti 4WD. While the new Alfa chassis remains compatible with earlier Tamiya Touring Car chassis, the motor, gearbox and battery have been moved slightly forward for better handling with high-power motors. The front suspension arms are also longer, moving the pivot-point farther inside the wheel for quicker steering. Also, Mr. M. Tamiya, President of Tamiya America, holds a prototype of the 1/10-scale Newman/Haas K-Mart Texaco Lola Ford Indycar driven by Nigel Mansell. Great to see Tamiya in the Indy Car business.

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- *ROAR 1/10th, On-Road, Modified National Championship* - Joel Johnson
- *ROAR 1/12th, On-Road, Modified National Championship* - Joel Johnson
- *4-Cell Modified Winter Nationals Modified Championship* - Mike Blackstock
- *U.S. Oval Masters Modified Championship* - Mike Blackstock
- *ROAR 1/10th Speedway Modified National Champion* - Ernie Bucc

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PRODUCTS & PRESIDENTS

1/10-SCALE T-BIRD.... 3/4-SCALE MARTIN

Here's our publisher, Louis DeFrancesco Jr., and Parma President Ken MacDowell holding the officially licensed Parma Valvoline Thunderbird while standing with a not quite full-scale version of stock-car driver Mark Martin. Mark was feeling a bit flat that day; didn't have much to say. Also, here's a closer look at that Parma '29 Ford Roadster.

Is that "Alien" hiding under the hood?

Pro-Racer Silicone Shock Oil

"Whether you race at the North Pole or the new track in Hell, our oil stays true to weight."

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- Allows precise tuning of your suspension to match changing track conditions

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HIGH TEMP-TATION

Bill Jeric of Great Planes is holding the new Turbo Inferno. This latest "infernal-incarnate" of Kyosho's 1/8-scale World Champion comes with $150 of upgrades at no extra charge! Truly tempting.

Matrix Makes Good

In their first major race, Matrix and driver Jeff Wittman finished second in 4WD behind National and World Champion Brian Kinwald at the 5th Annual Reedy Top Gun Off-Road Championship. Also interesting, Matrix had the only 6-cell-powered car in the 4WD A-Main. Each Matrix motor is dyno-tested at 12 different loadings. Motor timing on modified motors are fine-tuned for maximum power output. Dyno results are processed and printed on 4-line charts showing each motor's performance graphically.

DYNAMITE BODY

No, not Horizon Hobby's skinny Marketing Publicist Chris Miksovsky's body—I'm talking about the Dynamite NPT Gas Car body. Specifically designed for 1/10-scale on-road gas racing, this Nissan NPT91 wide-body features: .040 Lexan construction with a high degree of scale detail and a high-angle kick-up rear body for greater downforce.

CHEER FOR CHARITY

The 38-year-old Helping Hand organization, dedicated to infant and adult developmental disabilities, was on hand running races with gas-powered Corvettes donated by Traxxas. The entry fee was $4. Two Chicago Bulls cheerleaders—the Luv-A-Bulls. (Sorry about the cutsie politcally incorrect name. Please don't hate me, Sally Jessy Raphael.) were there to race and help "catalyze the emergence of a competitive spirit in reticent young men." Ken Werner (center) is Helping Hand Director of Development and Public Relations; Jodi Emanuel (left) is a 5-year Chicago Bulls veteran and a full-time merchandiser for Nordstrom; and Maria Del Carpio, who is a loan officer, is in her second year as a Luv-A-Bull. Traxxas and the Chicago Bulls Cheerleaders are to be commended for helping with such a worthy cause. In a giving mood? Contact Helping Hand Rehabilitation Center, 9649 West St., Countryside, IL 60525.

Faster & Faster

According to Trinity, "the fastest NORRCA-legal stock motor is even faster." Born from Epic EX technology pioneered in the Slot Machine II, the Monster Stock Jr. 2 features all-new can, endbell, armature and Epic "EZ-Flow™" air-cooled endbell design. The "lay-down" brush system has more commutator wraparound, thus giving greater timing change when cut brushes are used. This new, 36-degree, short-slot armature motor incorporates 5.0 wet magnets.

READERS' RIDES

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If the Ayatollah of Radio Controlla chooses your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fourth annual "Reader's Ride of the Year Contest" in the fall of 1994. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.

FAMILY FUN

James King (left) shows off his Outlaw Rampage, which is equipped with a DuraTrax tuned pipe, a blue heat-sink head and a slide-valve carb. Little brother John holds his stock Nitro Hawk; he plans to add a Dynamite pipe and some ball bearings. James's future mods will include a graphite chassis and a ball diff. These fellas live in Fussa, Japan, at Yokata. Their father, Terry—an Air Force captain—is thinking about buying a tricked-out Blackfoot, and the youngest brother, Phillip, will soon have a Hawk 2.

TEAM TRUCK?

We're sure we've seen this truck before.... Brian Mes of Diablo, CA, sent us this photo of his RC10T Team Truck, which is done up to look like the truck of Team Associated driver Mark Pavidis. Brian's truck is equipped with a Reedy Mr. L modified motor, a Tekin ESC and a Futaba 2PD radio system. You might be able to catch a glimpse of Brian and his truck—zipping around the track—at Hobby Haven Raceway.

TRICK T

Nick Freudenberg of North Bend, OR, sent us this photo of his stylish-looking LX-T truck, which is tricked out with Trinity Pushed P-170s and a Trinity Armageddon modified motor. To control his LX-T, Nick chose a Futaba 2PD radio system with a Futaba S9301 servo, and he airbrushed the body himself—with help from *R/C Car Action's* informative painting tips.

THE WARRIOR

Wayne Gregory of Brooklyn, NY, decided to take out his old RC10, dust it off and add new shocks and a new Dahm's Warrior body. Wayne's backyard basher is equipped with a Futaba 210 CB ESC, a Futaba Attack radio, a Pro-Line bumper, a Kyosho Mega Outlaw stock motor and Autographics decals. Future mods will include a Stealth tranny and new rims and tires.

TROUBLESHOOTING

by JOHN HUBER

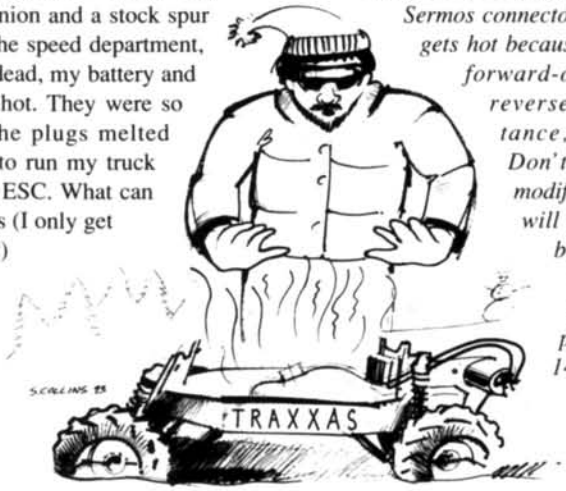
Illustrations by Steve Collins

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton, CT 06897. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

Total Meltdown

I've had my Traxxas Sledgehammer for about six months now. I've modified it with a Trinity Chris Doseck motor, a Futaba MC112B ESC and the Traxxas Pro Series suspension kit. I run a very small Robinson Racing pinion and a stock spur gear. My truck is OK in the speed department, but after the battery goes dead, my battery and speed controller get very hot. They were so hot the other day that the plugs melted together! I'm now afraid to run my truck for fear of burning up the ESC. What can I do to get longer run times (I only get about 3 to 4 minutes now) and still get top speed? Please help!

Jeremy Linder,
Astoria, OR

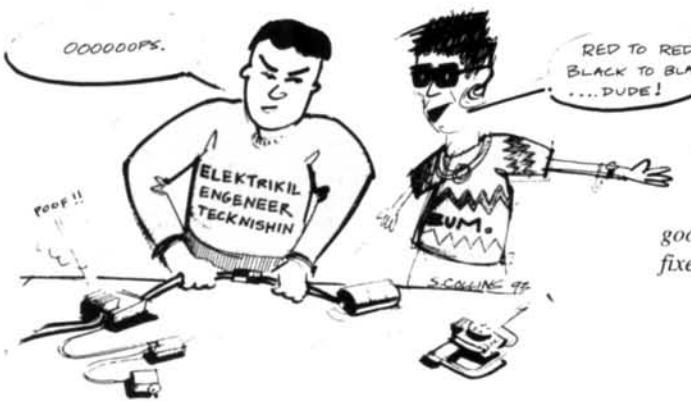


Jeremy, your connectors melted because they're worn out. As they are used, they get dirty, and they don't conduct as they should. This causes heat that will melt the two together. Try using a set of Sermos connectors. The speed controller gets hot because it isn't a racing-style, forward-only unit. Models with reverse have a higher resistance, so they get warmer. Don't try to use a super hot modified or a large pinion; it will get even hotter. To get better run times, you need to gear down or get a better battery pack. If you're using 1400mAh cells, try a set of 1700 SCRCs.

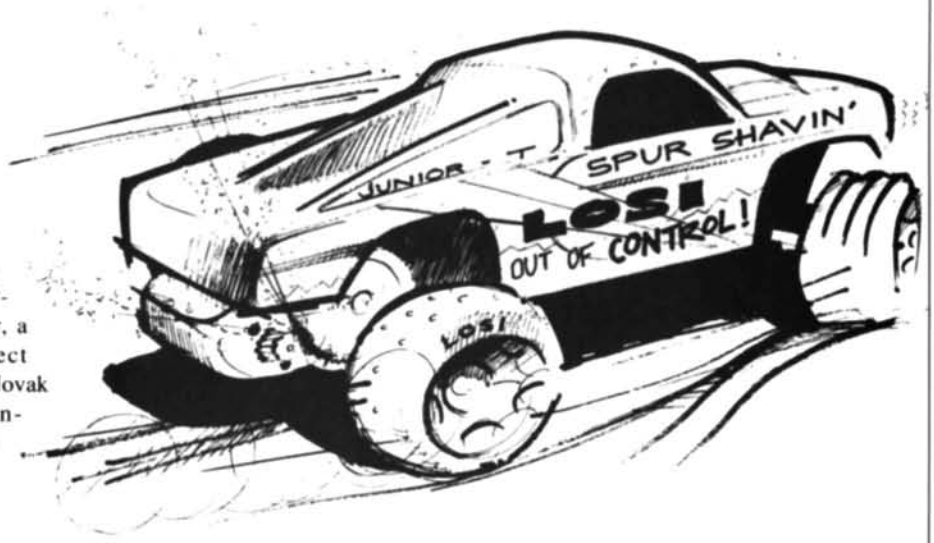
Dems Da Brakes

I own a Tekin 600 ESC. I accidentally plugged my battery in backward while the switch was in the "off" position. The car's wheels started spinning backward. I immediately unplugged the battery. (It was connected to the speed controller for about 10 seconds.) Afterward, I plugged the battery in correctly. The speed controller worked fine in forward, but it had no brakes. Do I need to buy a new speed controller, or can I fix this one? I appreciate your help!

Amir Michael, Zichron,
Yaakov, Israel



Amir, I've done the same thing. I don't know exactly why, but it's usually the brakes that go. If you send the unit back to Tekin, they'll repair it for a small price. The 600 is a good speed controller; you should get it fixed.



Run Away! Run Away!

I have a Team Losi Junior T with a Futaba FP-T2PB Magnum Sport, a Futaba FP-R112JE AM 75 receiver, a Futaba FP-148 Indirect Drive servo and a Team Novak T-4 Tempfet speed controller. I use a Sanyo 1500 Sport Pak Plus. My problem is that at the end of its run time, the truck goes wild, and I can't control it. What's wrong? I also have a problem with stripping gears. I have a Team Losi JR's Choice motor with the original transmission in it. A friend suggested that the problem might be the rpm of the motor. Could this be true? Please help!

Jason Cooke,
Winchester, VA

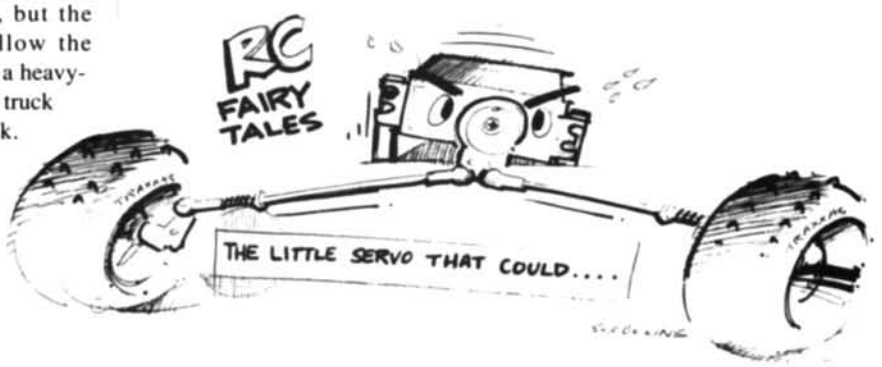
Jason, your runaway problem is common. When you reach the end of the pack's power, the motor can draw too much juice from the BEC circuit. Because the motor is drawing so much, the receiver loses all power. Although some ESCs and radio systems have features that will eliminate this problem, you just have to be careful. When you start to notice the car slowing, bring it in before it dumps too far. Don't jam the throttle; this is usually when the problem occurs.

Wimpy, Wimpy, Wimpy!

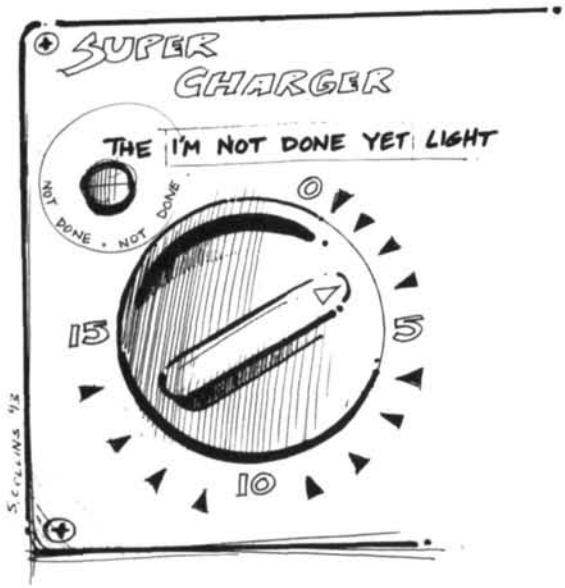
I got my Traxxas Hawk II a week ago. I installed the Futaba FP-S148 servos that came with my Magnum Sport. The problem is that I can't get the truck to steer correctly. With the alignment adjusted according to the directions, the wheels just barely turn. The servo works well, but the servo-saver doesn't allow the wheels to turn. Do I need a heavy-duty servo? I will run the truck on my off-road dirt track. Thanks for your help!

Bryan Appodaca,
Port Deposit, MD

Bryan, your servo-saver is probably fine. The problem is most likely your servo. The S148 is Futaba's least expensive servo, and it's not very strong. You want something with more power, such as the S9301. This will allow you to navigate better. Check your local hobby shop to see which servos they have. A better servo will cost between $40 and $80.



Crank It Up



I own a Pro-Tech Super Charger, and when I charge my batteries, they don't even come close to being fully charged. If I turn the timer back about 5 to 8 minutes, then they get fully charged. Do I have a bad fuse? Or are my batteries bad? I use a 7.2V, 1200mAh Reedy power SCR pack. Can you help me?

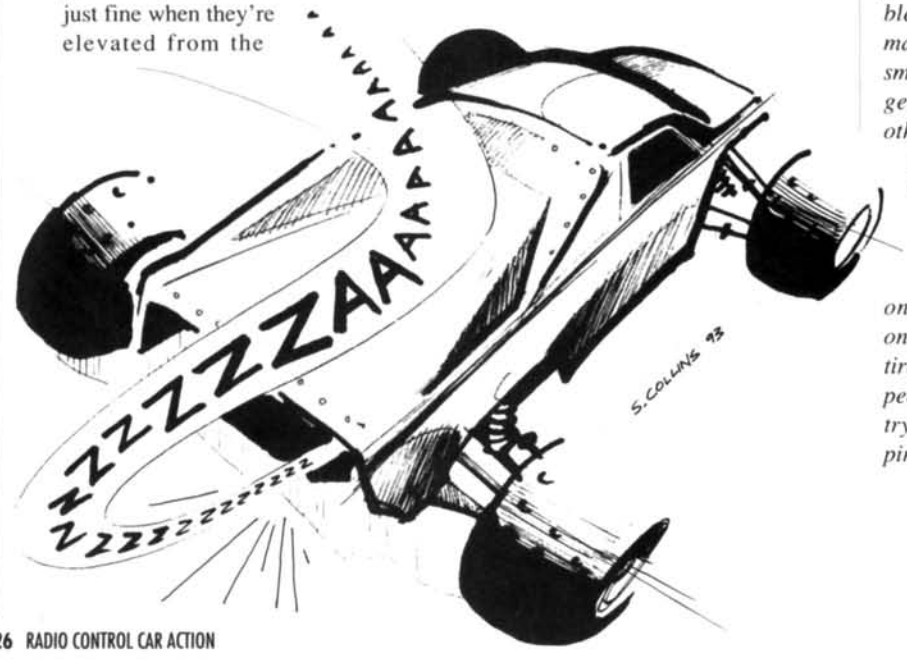
Josh LeBlanc, Gresham, OR

You've got the right idea, Josh, but how warm does the pack get? Sometimes, the 15 minutes on the timer isn't enough to fully charge a pack. You can give it another 5 minutes and monitor the battery temperature. As the pack reaches full charge, the temp will begin to rise. A fully charged pack will be warm, but not hot. You can also hook up a digital voltmeter to the battery leads to monitor the pack voltage. As the pack reaches full charge, the voltage will stop climbing. When the pack reaches its highest voltage and starts to decline, it's ready.

Slippin' Diff

I own an Associated RC10T with an Airtronics Avenger AV2S and a mechanical speed controller. Just a couple of days ago, I got the radio and the battery pack for the car. When it was ready to run, I found out that the wheels wouldn't turn when they were placed on the ground. (They turn just fine when they're elevated from the ground.) The gears turn, but the wheels don't. The local hobby shop said that the problem was in the ball diff and that I should rebuild it. I did that, and it worked for 2 seconds. Is it just a bad ball diff, or is it something else? What should I do?

John Prochniak, Racine, WI


ZZZZZAAA

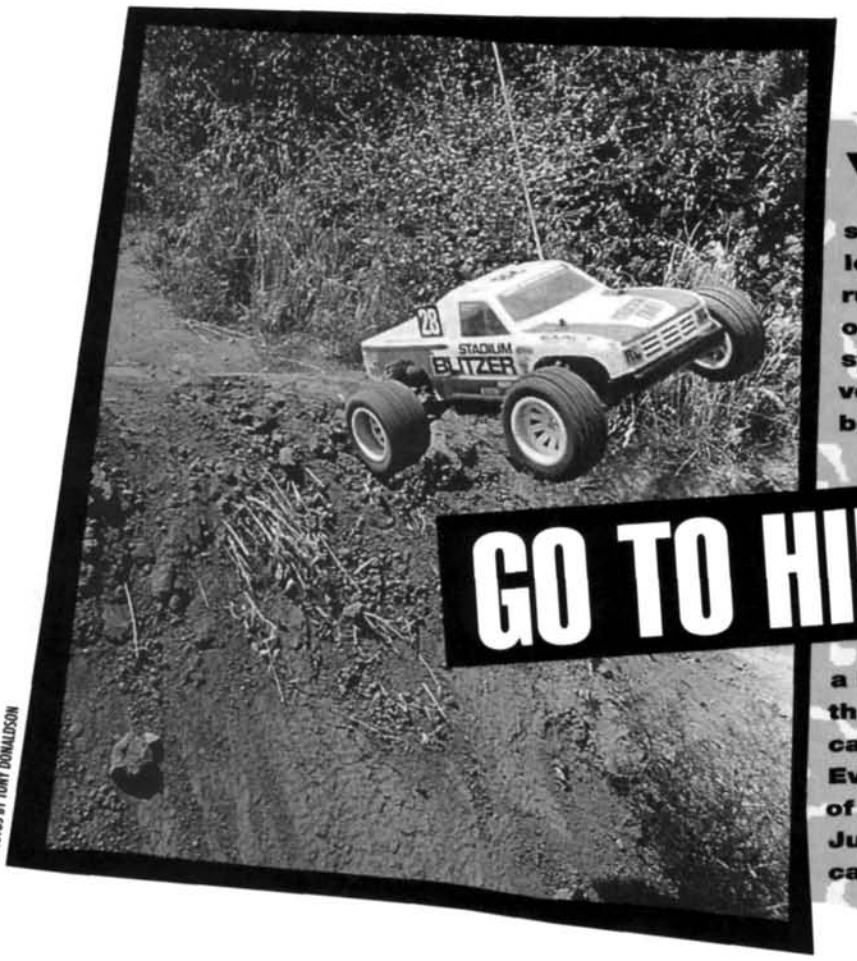
Too much fun!

by Tony Donaldson

WARNING! If you're a race-only, never-take-your-buggy-off-the-track kinda motor head, don't read this. If you love to take your vehicle everywhere and want to beef up your driving skills, however, or you just want to have tons of fun, I've collected a few tips from hobby shops and radio (controlled) heads. Having acquired my first buggy a few months ago, I'm a rookie to this great pastime. I watched a few races and I wanted to race, but I haven't taken the plunge yet; something is holding me back. Maybe it's because I'm chicken and in awe of the high-tech goodies that the fast guys run with. At any rate, I'm amped to go out and have a lots of fun. By talking to a lot of enthusiasts, shop owners and racers, I found out that there are endless things you can do with R/C cars that don't involve formal racing and that are more fun than should be allowed.

The Buddy System

One fun thing you can try is a tandem run. There are motorcycles with sidecars and tandem bicycles (with one rider behind the other), which can be challenging. But driving an R/C car in tandem is more complicated than running a three-legged race. Imagine two people running one car: one controls the throttle, the other controls the steering. The first time you try it, do it in a very big open space and pray that your partner has quick reflexes!



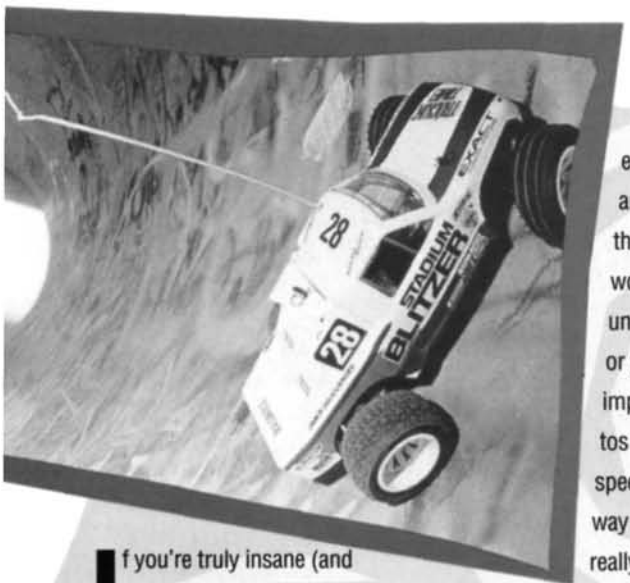
PHOTOS BY TONY DONALDSON

GO TO HILL!

You can also go climb a hill. Find one that's somewhat steep and is long enough to give you a run of at least a few seconds. Just try to hold a straight line. If your hill is very short, it might work better as a jump. These are the sorts of thing you find at BMX tracks and local BMX jumping spots. Ask at a bike shop to see if there's one near you. You can even build your own Evel Knievel-style ramp out of plywood and bricks. Jump over your friends' cars—if they trust you.

Terrorizing the Tarmac

Another thing two or more people can do is race in an empty parking lot. (Be sure your running area is away from traffic.) Set up markers for your course and go for it! If you think best in a straight line, challenge your friends to a drag race to see who has the fastest setup off the line. Drag racing can also be used to compare how your car runs before and after a modification. Other flatland madness includes slalom runs (soft-drink cans make great markers).



Mr. Toad's WILD RIDE

If you're truly insane (and have a large pocketbook for expensive repairs or a ton of luck and a dash of skill), try running your car in a drained swimming pool and empty drainage ditches. You can perform skateboard-like maneuvers on these surfaces from a safe controlling distance. It's way too much fun to put into words: it's something that has to be experienced. The smoother the transitions are, the more control you'll have and the smoother your landings will be. I wouldn't recommend this type of activity unless you can afford to replace your car or you have another one that's more important to you. When we shot the photos for this article, we started at slow speeds with easier stunts and worked our way up the ladder of craziness. We were really lucky; the biggest mishap we had was when the truck landed sideways off a jump and the tire came off the rim. Remember that, for their size, R/C cars can reach dangerous speeds, and they can cause serious injury if they hit someone.

When it comes to doing exciting things with your car, your only limits are safety and your imagination. A few shop owners and racers tried to discourage us from doing some of this stuff, but we found it waaaay too much fun not to try it.

And fun is what R/Cing is all about, right? ■

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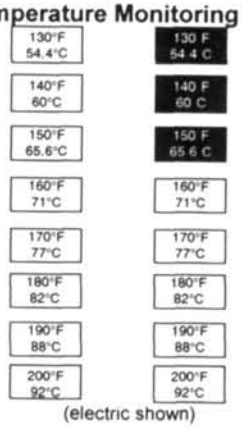

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Uni-Vice

This unique new handle is ideal for holding small tools, such as files, drills, reamers, taps, wires, countersinks and small wire brushes. It's small and light, so it fits your hand comfortably and is great for close-tolerance work. Use it as a "starter" for screws and other parts that are too small to hold in your fingers. The Uni-Vice comes in three size ranges, and they're color-coded: dark blue (holds tools with a shaft diameter of 0.046 inch to 0.083 inch); lilac (0.079 to 0.118 inch); and light blue (0.118 to 0.157 inch).

Prices—$9.50 each; $26.50/set of three.
Titan Tool Supply Co. Inc., P.O. Box 569, Buffalo, NY 14207-0569; (716) 873-9907.

TECNACRAFT

1/12-Scale Aluminum Hubs

Tecnacraft's new 1/12-scale racing hubs for the Associated 12LW were designed using auto-CAD to be the lightest, truest-running hubs available. Made of high-quality, CNC-machined aircraft aluminum, they've been computer-balanced to allow smooth acceleration and high speeds.

Part nos.—PN-70360 (diff hub), PN-70361 (left-side hub), PN-70362 (hub set); **prices**—$14.95, $17.95, $31.50.
Tecnacraft, 1335B Dayton St., Salinas, CA; (408) 422-7466.

INSIDE LINE

Bumper Handle

For rear shock protection and convenience of handling your car, this black-anodized aluminum bumper handle is the only way to go! It can be bolted right on—no modifications required!—and it fits Serpent 1/10- and 1/8-scale cars.

Part no.—6100; **price**—$23.95.
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Similar in design to the full-size Moto-Tool®, Dremel's MiniMite is a versatile, palm-size, cordless rotary tool. With two-speed operation (5,000 and 10,000rpm), it can be used to cut, grind, sand, shape, polish and drill wood, metal and plastic. The MiniMite is powered by a 4.8V motor; it can run up to one hour on one charge; and its replaceable battery pack can be recharged in only three hours. It comes with five precision tool bits and a wall-mounted charging unit with an LED readout. It will accept all Dremel 1/32-to 1/8-inch bits, and it's available at hardware stores, home centers and hobby retailers.

Part no.—750; **price**—$39.99.

Contact **Mark Driggs, Ruder Finn Inc.,** 444 N. Michigan Ave., Chicago, IL 60611; (312) 644-8600.

KYOSHO
Outrage

Kyosho's new 1/10-scale Outrage 2WD electric buggy is everything a good first car should be: easy to build, easy to operate, durable, reliable and very affordable! If you can't wait to race, Kyosho also offers the Outrage in a 90-percent-built ARR. Both Outrage models accept widely available Ultima hop-up parts, so there's almost limitless upgrade potential!

Part nos. KYOC0194 (Outrage), KYOC0196 (Outrage ARR); **prices**—$119.95, $139.95.

Kyosho/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826; (217) 398-6300.

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This superpower servo generates a monstrous torque output of 91 ounces/0.13 second and 77 ounces/0.16 second. Its revolutionary helical gears allow this servo to be only slightly larger than a regular-size servo, and it has double ball bearings that ensure extra-smooth operation.

Part no.—HSE0605; **price**—$59.95.

Hitec RCD Inc., 10729 Wheatlands Ave., Ste. C, Santee, CA 92071; (619) 258-4940.

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TRINITY®
Evolution 10

MAGIC TRICKS

by Joel "Magic" Johnson®
IFMAR World Champion

I guess that, by now, you're tired of hearing that I won another race. The Cleveland 4-Cell Indoor Championship was my latest win, and I will be the first to admit that, this year, winning has been easier than ever before. The reason is the Evolution and Revolver cars that I've been running.

The secret to the performance of these cars is all in the front end. On-road front-end technology has been at a virtual standstill all these years, until Jim Dieter put that first EV10 on the track at the World Championships in Pomona.

The front of the car determines the car's line through a corner—the back just follows the front around. Just watch an Indycar race. Ninety percent of the time they make aerodynamic changes during the race, it's at the front end. When we started to design our own car, our research showed the front suspension system was severely lacking in technology in the cars currently on the market.

At Cleveland, the track gets stickier each run, and cars were either pushing violently or doing traction rolls. Not the case with the Revolver 12p and its Reactive Caster front suspension. I was able to adjust my car each time I ran to keep ahead of the track conditions, instead of chasing them all weekend.

The design of the front end allows adjustments of the caster and camber. This is accomplished simply by turning one or both of the turnbuckles that make up the upper A-arm. You can easily adjust how much active caster you have, which in turn will affect how quickly your car steers into a turn. This also allows you to set your car so that the front tires wear flat. This is impossible on the other cars, where you must stuff plastic wedges under front suspension arms.

Even if you don't run an Evolution or Revolver car, you can still use our technology to make your car quicker. We offer Reactive Caster Suspension conversion kits for the Associated 10L, 10L SS and 12L. They are easy to assemble and simply bolt on to the chassis with no drilling required.

EV0011 .....10L Front Suspension Conversion $79.99

EV0012 .....10L SS Front Suspension Conversion $79.99

RE0005 .....12L Front Suspension Conversion Kit $49.99

Until next month,
The "Magic" Man

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RACER NEWS

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R/C THUNDERDROME

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Fasten Your Seatbelts,

because it's time to feel the power, see the speed, witness the insanity...that's right, it's Thunderdrome time!

The sixth annual R/C Thunderdrome was held October 8 to 10, 1993, at the CSU-Dominguez Hills Olympic Velodrome in Carson, CA. Brought to you by *Car Action* and Futaba; organized by Dan Moynihan and Gary McAllister; and sponsored by KNAC 105.5 FM, Coors Cutter and Adohr Farms Dairy (just to name a few!), the Thunderdrome is one of the most talked-about racing events in the R/C industry.

It's make or break time! In the Superspeedway Shootout, accurate pit stops are crucial.

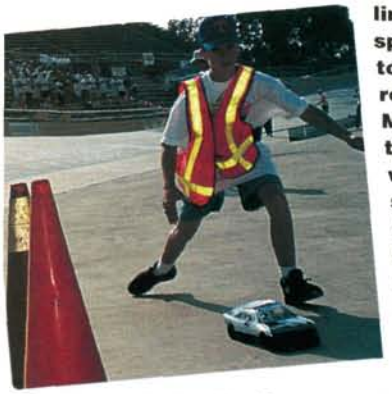
by GEORGE GONZALEZ

ERDROME®

1993

Insane Speed Run

By far, the most anticipated event at the '93 Thunderdrome was the Victor Engineering Insane Speed Run. Once again, the title of "World's Fastest R/C Driver" was at stake. Joe MacGregor's HPI 10L conversion nearly set the track on fire when it took off. By the time it hit the back stretch, you could tell that it was flying at record speed. The most amazing thing about MacGregor's car is that it was virtually silent. It crossed the line with an average speed of 87.41mph to set the new speed record. Later, MacGregor revealed that his winning car was powered by a state-of-the-art Aveox brushless motor and a special speed controller (see sidebar, *right*, for more info!).



1.	Joe MacGregor	9.479	87.41mph
2.	Danny Egger	9.845	86.56mph
3.	Ron Ponce	9.927	85.84mph
4.	Mike Lavacot	9.941	85.72mph
5.	Gary Hamilton	10.092	84.44mph
6.	Shawn Ireland	10.147	83.98mph
7.	Derek Povah	10.271	82.97mph
8.	Ted McDonald	10.792	78.96mph
9.	Chris Farrell	11.342	77.19mph
10.	Tony Gammel	11.287	75.50mph

The Aveox Advantage

When I was walking around the pits, I noticed something very peculiar at the HPI table. Several of the team drivers, including Joe MacGregor and Gary Hamilton, were using some strange-looking motors and speed controllers. When I got a closer look at their cars, I realized that they were using brushless motors and special speed controllers manufactured by a small company called Aveox. Although brushless-motor technology has been around for decades, they've never been commercially available for R/C cars.

Brushless motors have several advantages over standard brush motors:

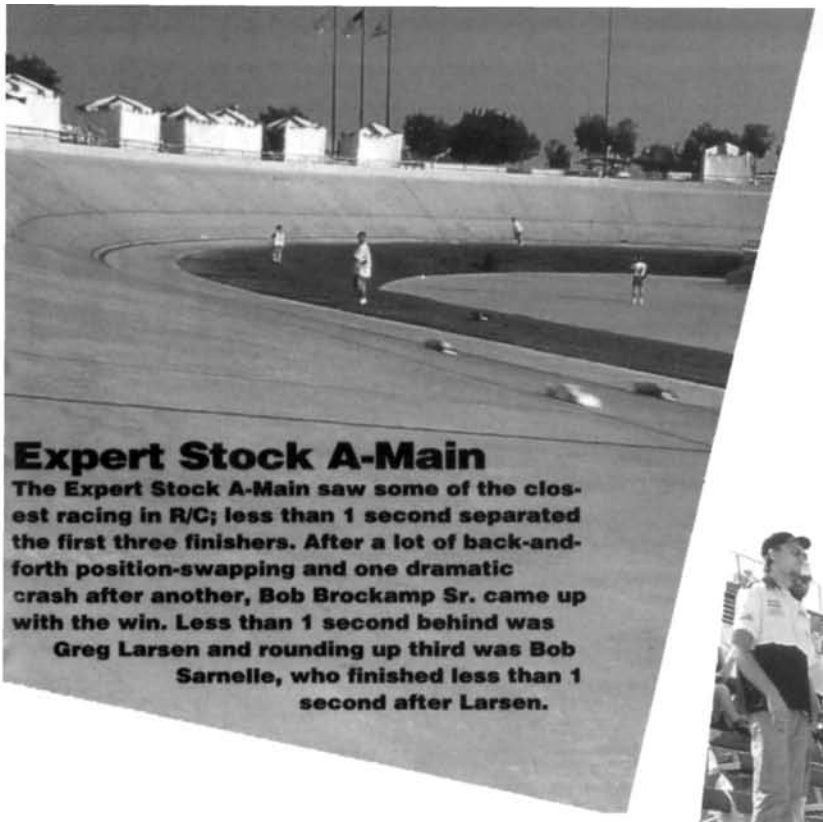
- **They're more efficient.** More of the power goes to the pinion gear and less to wasted heat.
- **They're more consistent.** Because there aren't any brushes and commutators to wear out, they'll have the same consistent high performance out of the box and hundreds of runs later.
- **They're more powerful.** Brushless motors can produce the same power as motors twice their size.
- **They're more reliable.** The only moving parts are the ball bearings and the shaft.

The Aveox brushless motors and speed controllers worked very well at the '93 Thunderdrome; Joe MacGregor used them to set the new Insane Speed Run record of 87.41mph! I look forward to seeing other developments with this kind of technology in the near future.

Dave Palumbo of Aveox holds two of the company's brushless motors.

Concours Judging

Judging a concours event is not an easy job! It was very difficult to choose the winners because there were so many beautiful cars lined up on the infield. First prize went to Jeremy Kornblatt for his meticulously detailed Meineke T-Bird; second place went to Brian Pearson for his beautiful Tool Time T-Bird; and rounding up third was Tom Kendall, with his totally awesome Kendall T-Bird.



Expert Stock A-Main

The Expert Stock A-Main saw some of the closest racing in R/C; less than 1 second separated the first three finishers. After a lot of back-and-forth position-swapping and one dramatic crash after another, Bob Brockamp Sr. came up with the win. Less than 1 second behind was Greg Larsen and rounding up third was Bob Sarnelle, who finished less than 1 second after Larsen.

Expert Modified A-Main

The Expert Modified A-Main was a real spectator-pleaser. With average speeds of more than 60mph, we're talking about some fast action here! Joe Ward really turned things on, and he was the only driver to complete 18 laps. Ward won the class with a comfortable margin and finished with a time of 18 laps in 4:09.75. Bob Brockamp Jr. finished second with a time of 17 laps in 3:55.61, and Bill Beauchemin took third with 17 laps in 4:06.79.

Superspeedway A-Main

The *R/C Car Action* Superspeedway Shootout is by far the most true-to-scale R/C race in history. Drivers must complete a 200-lap Enduro race, which requires frequent pit stops to change batteries. Each driver is allowed a two-man pit crew and a personal timekeeper. All the cars competing in this event were equipped with quick-change battery systems, and, in most cases, a few short seconds is all it takes to have the car back in the race with a fresh battery pack. This is as close to full-size NASCAR racing as you can get!

It was truly amazing to see 20 superspeedway cars racing at the same time. After the first 5 minutes, the cars were so spread out that it looked as if there were four races going on at the same time! Gary Hamilton was the leader for the better half of the race, and Kent Clausen was constantly putting the pressure on him. Top-qualifier Danny Egger was less than two laps off the pace, as were Shawn Ireland, John Peterson and Joe MacGregor. At around the 150-lap mark, Hamilton pegged a stalled car on turn 2 and wiped out. One of the turn marshals was quick to get Hamilton's car back on the track, but the crash damaged it, and it just wasn't running well enough to pick up the pace.

On the last lap of the race, Joe MacGregor and Shawn Ireland were on the same lap and heading toward the finish line. MacGregor crossed the line first and finished with a time of 48:57.33 to win. Shawn Ireland was second in 48:58.33 (talk about close!), and John Peterson finished third with a time of 199 laps in 49:05.21.

Secret Admirers

After the race had ended, I found a letter in my camera bag. It was written by four amateur racers who wanted to express their appreciation to NORRCA director Chuck Mann for his hard work and dedication. I was touched by the letter, and thought it was worthy of publication, so here it is—unedited and in its entirety.

"To whomever writes this story:
Some of us amateur racers would like to thank Chuck Mann, the NORRCA Director at Thunderdrome. He not only ran tech and the race, but he also spent hours after the race day was over to walk through the pits and give us tips on what to do to make our cars faster. He also loaned out tires, chargers and a PCM radio to racers who were having trouble. This equipment was his own. He did a great job, and we thank him."

It takes people like Chuck Mann to keep this hobby thriving! Thanks for a job well done.

THUNDERDROME

Car Action's Chris "Merlin" Chianelli is seen here with Dan Moynihan and Gene Husting of Associated Electrics.

Donn Rice of Futaba tried to blow away the competition.

Celebrity Race

Fin.	Name	Claim to Fame
1	Bob Novak	Novak Electronics
2	Chris Chianelli	Car Action Groupie
3	Jay Kimbrough	Kimbrough Products
4	George Gonzalez	Car Action writer
5	Tom Cat	Pegasus Hobbies
6	Dave Kisbey	Hobby Products International (HPI)
7	Donn Rice	Futaba
8	J.R. Sitman	NORRCA President
9	Gene Husting	Associated Electrics
10	Brett Reichert	*R/C News*

Above: just like full-size racing! Left: Tyco displayed one of their new H.O. racetrack kits at this year's event.

Futaba Amateur Challenge

Sportsman Modified

Expert Modified

Sportsman Modified

Fin.	Qual.	Name
1	1	Larry Pipp
2	8	Jim Valentine
3	5	Steven Jacquez
4	18	Shannon Shunk
5	10	Tony Jackson
6	6	Bob Porter
7	4	Doug Doss
8	12	Bill Wishon
9	15	David Fossen
10	16	Mark Anton
11	2	Suparat U
12	13	Derek Black
13	17	Don Winans
14	19	Ronald Aggus
15	7	Joseph Myers
16	20	Donald Natale
17	14	Donald Baligad
18	11	Zale Schuster
19	9	Burton Hooker
20	3	Rex Adams

Expert Modified

Fin.	Qual.	Name
1	5	Joe Ward
2	4	Bob Brockamp Jr.
3	17	Bill Beauchemin
4	20	Dan Lee
5	6	Steven Saik
6	12	Shawn Young
7	15	Peter Dahlbom
8	14	Roger Vorba
9	8	Greg Greene
10	9	Jeremy Kornblatt
11	3	Frank Killam
12	11	Jim Molnar
13	1	Brian Bowler
14	7	William Brown
15	16	Todd Nalley
16	18	Don Ham
17	10	John Ligons
18	13	Ed Allen
19	19	Steve Cervantes
20	2	Steve Nelson

Sportsman Stock

Expert Stock

Sportsman Stock

Fin.	Qual.	Name
1	2	Vic Nalley
2	1	John Crowley
3	5	Dave Deerman
4	7	Jamie Karberg
5	13	Jeff Lockaton
6	19	Ed Snell
7	10	Doug Adams
8	15	George Agard
9	11	Daniel Baligad
10	16	Eddie Gutierrez
11	3	Rob Wagner
12	20	Steve Pacquing
13	18	Cosby Chestnut
14	9	Thomas Kendall Sr.
15	12	Gary Marques
16	8	Brent May
17	17	Jason Coffee
18	6	Curt Norheim
19	14	Jeff Gold
20	4	Tim Ganous

Expert Stock

Fin.	Qual.	Name
1	13	Bob Brockamp Sr.
2	14	Greg Larson
3	8	Bob Sarnelle
4	3	Tony Bracamonte
5	16	Jeremy Kornblatt
6	10	Brian Blazer
7	18	Ken Prue
8	7	Joe Blackburn
9	15	Tony Brockamp
10	17	Joseph Hawkins
11	4	Jeff Knize
12	19	Ed Allen
13	11	Chuck Burns
14	12	Danny Jones
15	5	Ross Pasillas
16	2	Brian Pearson
17	1	Rick Noel
18	9	Mike Ganous
19	6	Greg Moreland
20	20	Joe Maloney

Car Action Pro Super Speedway Shootout

Fin.	Qual.	Name
1	7	Joe MacGregor
2	10	Sean Ireland
3	9	John Peterson
4	6	Derek Povah
5	1	Danny Egger
6	8	Dave Pulfer
7	4	Brian Landgraff
8	13	Mike Kornblatt
9	17	David Johnson
10	18	Dob Carlos
11	14	Chris Farrell
12	2	Kent Clausen
13	3	Roger Pane
14	20	Todd Fossen
15	11	Sally Ham
16	5	Mike Lavacot
17	12	Gary Hamilton
18	19	Nick Case
19	16	George Vardzik
20	15	Bill McAneney

CAR ACTION

TRACK REPORT

ARE YOU READY to try something new and challenging—something fast and fun to drive Check out the new Kyosho* Suzuki RGV Hanging On Racer motorcycle. Like the motorcycl that Kyosho sold a few years ago, the RGV is 1/8 scale; what sets it apart from the olde bikes is its rider. He's not a solid chunk of plastic: this guy moves! The model is jointed a the shoulders, hips, knees, head and elbows, so he can lean with the bike in an oh-so-realistic way. Th only thing he *doesn't* do is put his foot down when the bike stops.

FINISHING

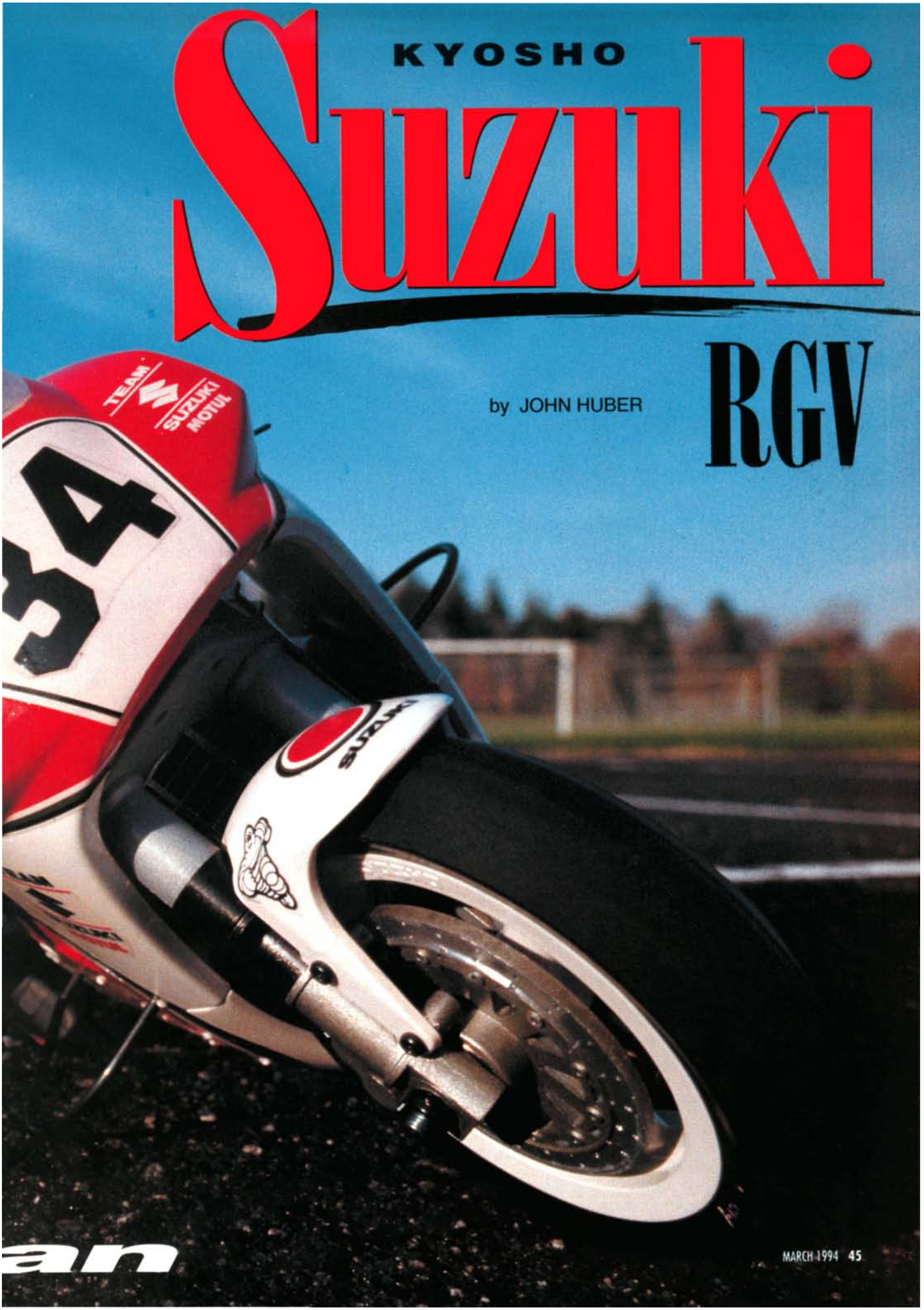
It might seem odd to start out by painting the model, but in this case, you have to change the usual steps to get the job done right. I started by scanning the box for all the parts that needed paint—mainly the rider, the fairing and the gas tank.

PHOTOS BY JOHN HUBER

Leanin' M

KYOSHO Suzuki RGV

by JOHN HUBER



I used a new paint called Tru-match*. It was designed to duplicate the colors of full-size racecars: for example, no. 33 yellow matches the NASCAR no. 33 Pontiac. I used no. 27 red, and I was delighted with

The rear wheel is driven by a real chain, whose tension can be adjusted by moving the motor/gearbox assembly.

the results. The paint sprayed on clean and fine, and it covered very well. After a couple of coats, I had a great, high-gloss finish. I also used Tru-match glossy black for the rider's helmet.

I joined the right and left fairings and glued them together with CA; I sanded the seam and added a little putty to make it invisible. Then I painted the fairing, the tank and the rear cowl red. It's very easy to do a good job if you follow the molded-in guidelines. When it was dry, I began to apply the decals. Take your time and get them right! I joined the lower fairing to the upper half of the fairing, and applied the main round decals on the sides. Once they had been burnished on, I cut them at the seams.

With all the decals in place, I went one step further and sprayed all the white body parts with a clear coat of Testors Model Master clear. The clear coat gives the model a glossy, finished look, and it seals on the decals.

To get the driver's color just right, I used the same red paint as I used on the bike. After I had applied the driver's decals, I sprayed the whole thing with Testors flat clear. The flat coat looks much better than the glossy does on the clothes and boots. Of course, I left the helmet glossy.

To complete the detailing, I painted the front shocks, the brake calipers and disks, and the rear sprocket and brakes. Use a bright silver for the front and rear disks (where the small double holes are) and a darker silver for the surrounding parts.

SUZUKI RGV MOTORCYCLE

Manufacturer .....Kyosho
Type .....Racing bike
Scale 1/8
List price $139.95

DIMENSIONS:
Overall length .....10.5 in.
Width .....3.5 in.
Wheelbase .....7.25 in.

WEIGHT:
Gross (w/batteries) .....1lb., 12 oz.

BODY:
Type .....Fairinged cafe racer
Material .....Polystyrene

CHASSIS:
Type .....Delta box
Material .....Plastic

DRIVE TRAIN:
Primary .....Pinion/spur
Transmission .....Gear/chain
Bearings/bushings .....Plastic bushings

SUSPENSION:
Front: Type .....Front spring forks
Damping .....None: add silicone oil
Rear: Type .....Coil-over
Damping .....None

WHEELS:
Front: Type 3-spoke
Dimensions (DxW) .....2.25x.75 in.
Rear: Type 3-spoke
Dimensions (DxW) .....2.4x.85 in.

TIRES:
Front/rear .....Michelin radials

ELECTRICS:
Motor .....Le Mans DM20
Battery .....Kyosho 7.2V 270mAh
Speed controller .....In radio system

OPTIONS TESTED: ball bearings, GPW-02 rear shock.

HITS
- Incredibly detailed and realistic.
- Handles better than you might think.
- Fast!

MISSES
- A little tricky for a beginner. • Needs a very smooth parking lot to run well.

You might want to use Litespeed* protective film on the lower front fairing to protect it and the decals from being scraped.

PUTTIN' IT TOGETHER

Assembly is a little trickier with this bike than with the earlier Kyosho bike. One reason for this is that the articulated rider has a complex servo hookup. The instructions are clear, though, and if you follow them closely, you'll get it right.

Make sure that the gears mesh correctly and that they rotate smoothly. You might want to add Kyosho's optional ball-bearing set (KYOC-2203) at this point, because disassembly later would be a chore.

Use a little Kyosho 10,000 silicone oil in the front forks. This will give a little damping for the bumps. I checked to see whether the oil-filled front forks from the older Kyosho bike would fit, but there isn't a place to mount the brake calipers and the fender.

RADIO SYSTEM

The Kyosho motorcycles require a special radio system. The receiver, speed controller and servo are all one unit. The servo is permanently connected to the receiver/speed controller unit by a wire that I wish was a little longer. I used the Kyosho system with a Futaba* Attack III transmitter. I like using a stick radio with a bike, because it feels more natural.

RIDING

This bike is amazingly realistic when it's in action. As the bike leans to the right, the rider sticks out his right knee, turns his head and leans, too. When making figure-8s, it looks great—as if the little guy is muscling the bike around. You almost expect to hear him scream the first time you lay the bike down.

For best results, I recommend that you find a very smooth parking lot with no traffic and as few obstacles as possible. After all, these things don't have a bumper, and a fast front-end shot would break something, for sure. If it looks as if you're going to hit something, lay it down fast!

The faster you go, the wider your turning radius will be. If you slow down, you can make a turn within a couple of feet.

STEALTH BATTERIES

Honesty is our policy

Sanyo® 1400 SCR*	Type I	to 279	$30.00
	Type II	280+	33.00
	Type III	290+	36.00

*matched at 20 Amps

Sanyo® 1700 SCRC*	Type I	to 274	$30.00
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*matched at 25 Amps

Above prices include regular shipping (U.S.A. only), and are for 6 cell packs. 4 and 7 cell packs are also available.

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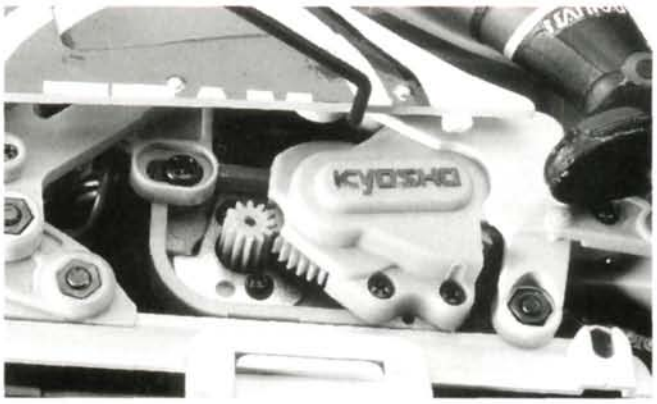


Here's a view of the pinion gear. Three gears are included to give you a selection of gear ratios. Metal pinion gears are available separately.

But at high speed, the bike has to lean so far over that the fairing scrapes the ground. This usually causes a spill—unless you can pull the bike up—but by that time, you've missed the turn.

For fun, set up a course with some film containers, and test your skill. It would be a blast to race with two or three of these bikes!

OPTIONS

As I mentioned before, adding bearings is a good idea. You might also consider adding the rear oil-filled shock unit (KYOC-5669). It's the same shock as was used in Kyosho's earlier bike, so your hobby shop might have an old one at a good price.

Once you're a master at the controls, you'll want to go faster. It's motor time (KYOC-1935)! If you want more run time, you can easily replace the standard 270mAh pack with a 600mAh pack. This pack should allow 15 minutes of run time, depending on your gearing. Other options include a set of metal pinion gears (KYOC-4746) and a lightweight front flywheel for faster steering response (KYOC-3544).

So, if you're ready for a new driving experience, Hang On! The new Kyosho Suzuki is a blast! And hey, they make a Honda, too.

Here you can see the mechanism that moves the rider. His torso is attached to the little posts that come through the seat. The small spring keeps his knees hugging the tank. This is an amazing design!

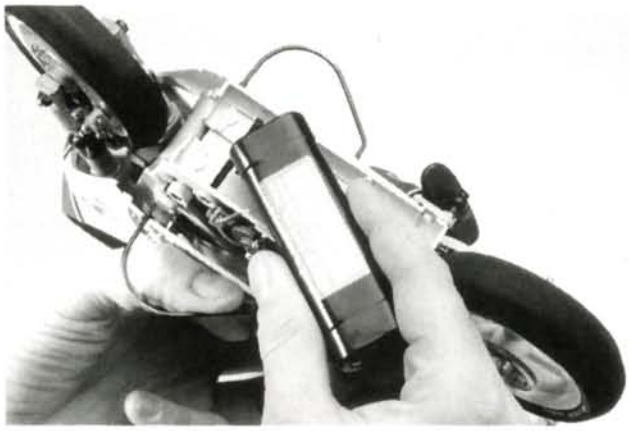
**Here are the addresses of the companies mentioned in this article:*

Kyosho/Great Planes Model Distributors, *P.O. Box 9021, Champaign, IL 61826; (217) 398-3630.*

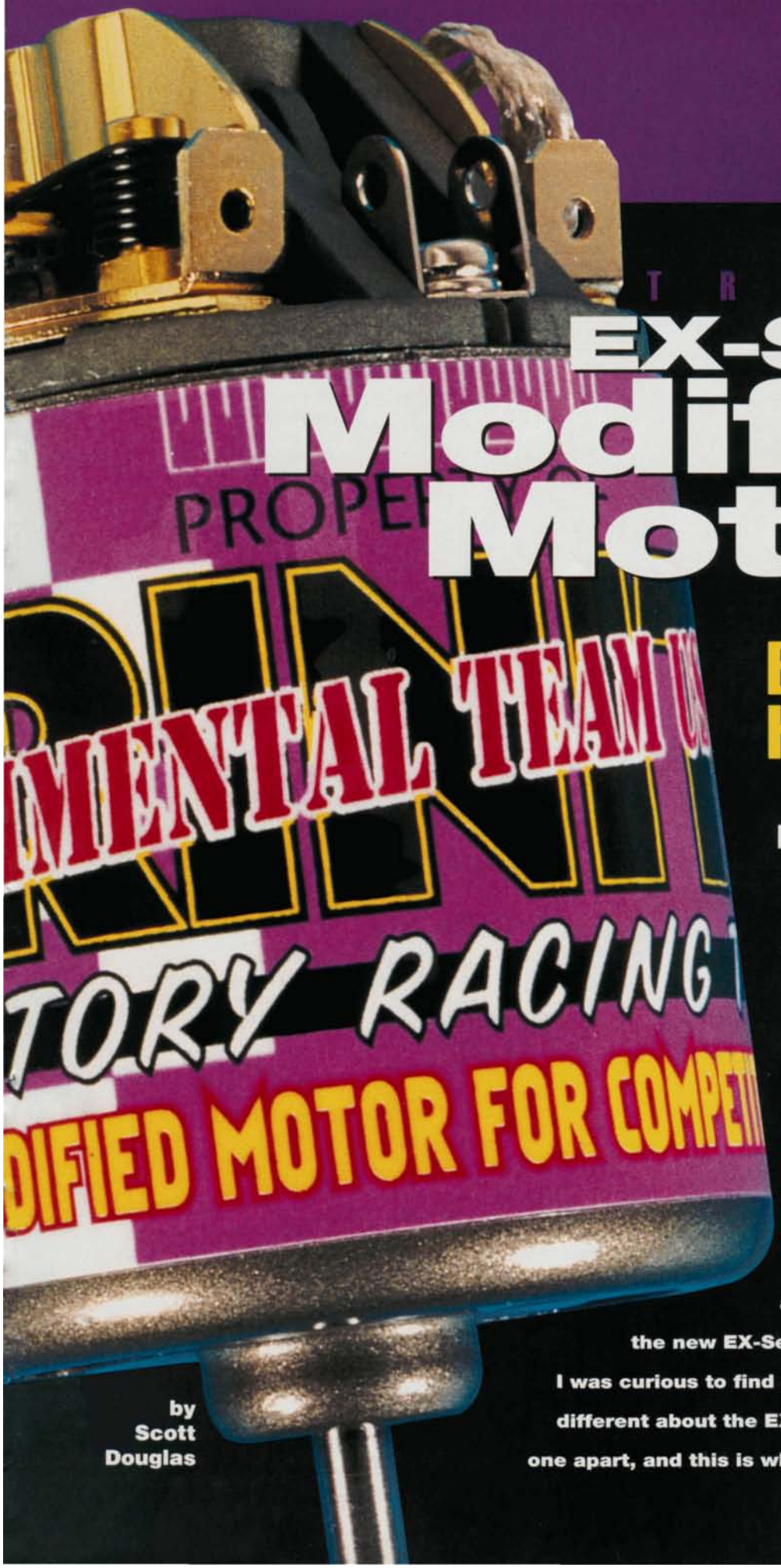
Tru-match; *distributed by Realistic Racing Colors Inc., 9335 Chester Rd., Richmond, VA 23237; (804) 743-8144.*

Litespeed, *P.O. Box 4765, Spokane, WA 99202; (509) 535-2717.*

Futaba Corp. of America, *4 Studebaker, Irvine, CA 92718; (714) 455-9888.* ■



This cute little pack looks like a baby stick pack. It's rated at 270mAh, and it will last from 6 to 10 minutes. For longer runs, you can use a 600mAh pack.



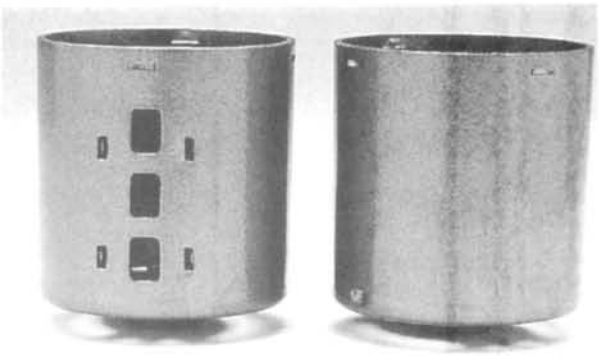
TRINITY

EX-Series Modified Motors

Experimental Horsepower

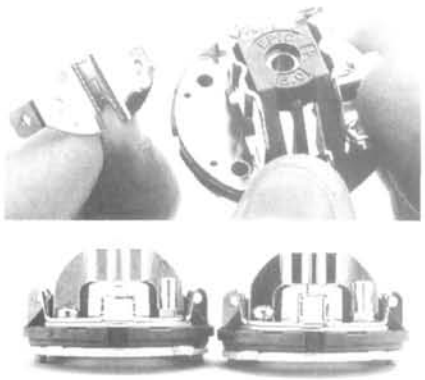
TRINITY* IS definitely on the leading edge when it comes to motor technology. Their stock motors—especially the new Slot Machine 2—incorporate many innovative features that enhance both performance and longevity. Now Trinity has taken what it learned from its stockers and applied their knowledge to the new EX-Series line of modified motors. I was curious to find out what's new and different about the EX motors, so I took one apart, and this is what I learned.

by Scott Douglas



Two types of can are available for the EX-Series motor. The vented can (left) keeps the motor running cool, while the full can has a stronger magnetic field.

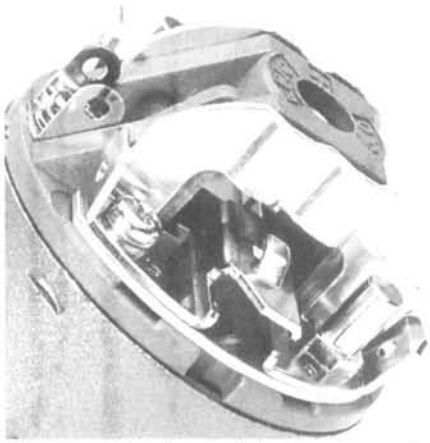
the EX endbell. As when using the vented can, changing the configuration of the brushes is an additional tuning aid; the standard arrangement may work well under certain conditions, and lay-down brushes may prove advantageous under others. Solid-copper brush hoods are available as options. Because copper is very effective at conducting heat, adding these brush hoods will keep the motor running even cooler. New,



Top: the brush hoods are keyed into the heat sinks so that proper alignment is maintained. Bottom: Trinity's lay-down brush hoods can be bolted right onto the EX-Series endbell with no additional modification.

CAN OPENER

The EX-Series modifieds (which are available in seven to 17 turns) come with a new can that has the latest 5.0 wet magnets for a strong and long-lasting field. What's unique is that there are two different types of can available: a full one and one that has six vent holes in its side. The full can has a stronger field, so you'd use it where you need more "punch," such as in off-road. The vented can has a slightly weaker field, but because the vent holes help to circulate air from the motor, the motor will run cooler. This can lends itself well to longer events. Trinity tells me that there's no concrete rule about the use of the cans, and that the type of can they use varies from race to race, depending on conditions.



The brush-hood/endbell design allows air to be pulled under the heat sinks for maximum cooling.

IS IT BETTER?

5.0 WET MAGNET—CONSTANT 5V					EX-SERIES MODIFIED—CONSTANT 5V				
RPM	Torque	Watts	Efficiency	Amp draw	RPM	Torque	Watts	Efficiency	Amp draw
29,275	1.4	32	50	12.6	33,869	1.4	36	49	14.7
27,859	2.9	61	64	18.8	32,077	2.9	70	70	19.9
26,650	4.0	78	69	22.4	31,030	4.0	92	76	24.2
25,138	5.0	93	72	25.7	29,989	5.0	111	79	27.9
24,569	6.0	109	73	29.7	29,017	6.0	128	81	31.6
23,167	7.1	122	70	34.6	27,994	7.0	146	82	35.7

BELL BOTTOMS

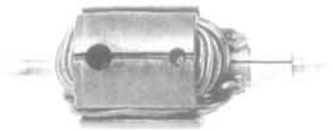
The EX motor's endbell fits the can much more tightly, so the armature spins more true. The brush-hood heat sinks are designed to keep the brushes cooler. To take away excess heat, air circulates around the horizontal part as well as the vertical part of the heat sinks. The brush hoods themselves are keyed to the heat sinks so that proper alignment is always maintained.

The EX-Series motors come with standard (vertical) brush hoods; Trinity's lay-down brush hoods can be bolted right onto two-sided eyelets allow the capacitors to be attached easily.

ARMED AND DANGEROUS

The EX-Series armature is similar to that of the previous 5.0 (gray can) motor, but there are several enhancements. First, the commutator's internal design has been improved to allow higher rpm with less chance of damage. Also, the armature blank itself has more space in which wire can be placed. This increases efficiency by allowing the use of larger-diameter wire.

Each of the armature's poles has a slot along the center of the outer part. (Trinity calls this its Armature Balance Concentrator.) This slot guides the drill bit that's used to balance the armature after it has been wound with copper wire. This slot ensures that each balancing hole is drilled dead center on the armature pole. Trinity maintains that the edges of these slots also help move warm air out of the can. Finally, to increase conductivity and durability, the armature windings are welded, not soldered, to the comm segments.



The commutator has been designed to allow maximum rpm, and the slots on each of the armature poles help guide the balancing drill.

Using the Competition Electronics* TURBOdyno, I tested an EX-Series 12-turn, quad-wind motor against a similar type in Trinity's 5.0 version. Look at the chart to see how they compare: as you can see, the EX-Series motor draws more amperage, but it makes more out of what it takes; the EX turned higher rpm than the 5.0 and put out a lot more power (in watts).

From the information yielded by my test, I've concluded that the subtle changes that Trinity has made to its modified motors really do make a difference to performance. After all, the dyno never lies!

**Here are the addresses of the companies mentioned in this article:*
Trinity Products Inc., *1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705.*
Competition Electronics Inc., *3469 Precision Dr., Rockford, IL 61109; (815) 874-8001.* ■

R/C DOCTOR

by DOUG MERTES

Repair Graphite Chassis

I've found that certain pan-car chassis always break in the same place. The front corners (where the bumper is attached), for example, of Associated's* popular 10L and 10L SS chassis tend to crack and then break during a collision. Why is this? Well, those corners are the most vulnerable section of any pan-car chassis, and there isn't enough material in the surrounding area to provide much protection during a heavy impact. That's why the 8-32 aluminum screws that are used to mount the bumper on the chassis plate rip right through the graphite.

QUICK, BUT UNRELIABLE, FIX

Typically, when breakage occurs, the car owner loads the chassis corner up with superglue or a two-part epoxy, screws the whole mess together and hopes for the best. Usually, the glues react with the chassis material and make it more brittle than it was before. The "gloppy fix," as I call it, might last for a little while if the car doesn't take another hard hit, but eventually, the repair will fail.

I've also seen racers make "breakaway" bumper-mounting screws by placing them in a lathe or drill and grinding off some of the shaft just below the head. The result is a screw head that will break off before the screw has a chance to rip through the graphite. It's a novel idea, but most race officials frown at hardware that drags on their nice, expensive carpet.

PROPER PRESCRIPTION FOR A BROKEN CHASSIS

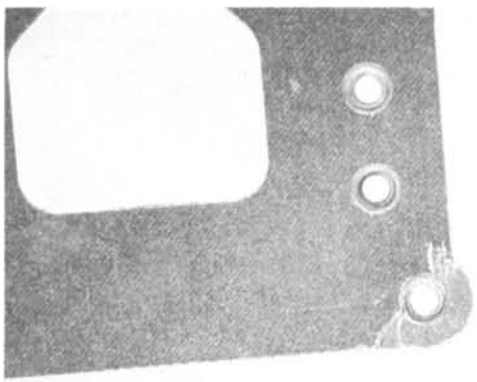
Now that I've made you feel paranoid about hitting anything stouter than a mushroom, I'll tell you how to make it all better. This fix is cheap, it's easy and, once you've finished, you'll find that you have a much more durable front end.

• **Step one.** Start with an 8x2½-inch piece of ⅛-inch-thick Kydex; any color will do. I've found it in red, blue, brown, beige and white, but black seems to be the most common. I buy mine at a plastics supply house called "Read Plastics" (check your Yellow Pages under "Plastics"), but certain R/C suppliers, such as Trinity*, also sell it to the hobby industry.

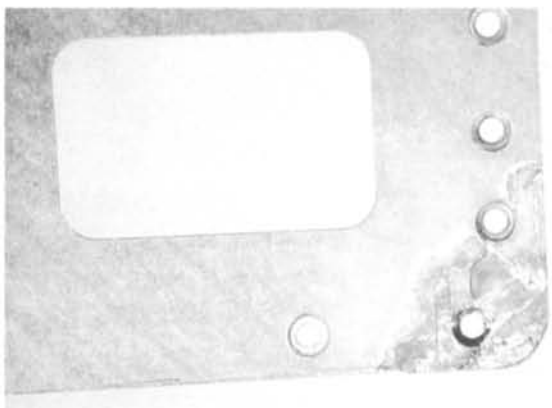
• **Step two.** Trace the outline of an Associated 10L SS bumper on the Kydex. If your Kydex is black, you'll have to use an awl or another sharp, pointed object to scratch the outline onto the smooth, shiny side. If you use any other color, a fine-point Sharpie marker works well. The important thing to remember is to join the two "scallops" on the stock bumper so that the new one runs straight across (see photos).

• **Step three.** Cut out the main bumper with tin snips or heavy-duty scissors, and smooth its edges with a hand file or a Dremel tool. Then cut a piece of 5¾x⅞-inch Kydex, ensuring that its edges are straight and parallel (see photos). This is the impact stiffener.

• **Step four.** Lay the original Associated bumper over the larger Kydex piece and mark the original



This is what happens when you hit a wall! A broken chassis could end your day at the races, but with a little money and a lot of ingenuity, you can make a quick comeback.



This is what I call a "gloppy fix": it will do for a short while, but it's not a good solution, and it's as ugly as sin!

TRINITY®

Left Side Drive Motors: What, Why, How

WHAT is a left side drive motor? The motors we use for R/C racing can turn either clockwise (CW) or counterclockwise (CCW). What is used in almost all cars and buggies is a motor that requires counterclockwise rotation. Counterclockwise means that if you're looking at the mounting end of the motor, the shaft rotates in the counterclockwise direction.

WHY do we need clockwise rotation motors? In the quest for better-handling oval cars, the motor is moved to the left side of the car. This requires a motor that turns in the opposite direction—clockwise (CW). The left side motor design puts more weight on the left side of the car and improves handling and traction. This is what we have done with our new "World Champion" Evolution 10ssl Left Side Drive Car Kit (no. RC-0013).

HOW do I get a clockwise rotation motor? The easy way is to buy one. With modifieds, the other possibility is to make yours run that way. Making the motor run backward is easy—just hook + and - to - and +. Everyone has done that at one time or another, though usually by mistake. The important item, however, is timing! If the timing of the motor isn't changed, it will run very poorly, get hot and perhaps burn up. Some degree of timing advance is needed for proper operation. Advanced timing is when the endbell is turned in the direction opposite the rotation of the armature shaft, usually about 15 to 30 degrees.

If you have a Trinity EX Championship 5.0 or other motor with timing marks on the label, changing the timing is very easy. Look to see where the endbell notch is pointing on the label, and mark this spot. Loosen the endbell screws and rotate the endbell back past the label's zero mark (the large line in the center of the little lines) the same number of lines as it was originally set to. If your motor doesn't have a label or marks, hold the motor with the endbell pointing at you and rotate the endbell about ½-inch clockwise; this will get you close.

If you race stock, your only recourse is to purchase a reverse-rotation motor like our new RC-2425 Slot Machine II Reverse. You can't properly reverse a stock motor because you can't change the timing.

Until next month,
Neal McCurdy
Trinity Team Manager

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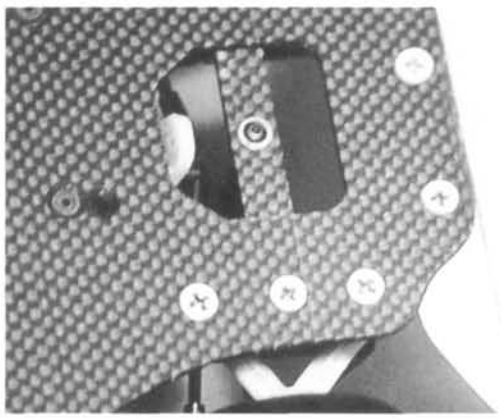


With a new Kydex front bumper/stiffener, my 10L's front end is as strong as it was when it was new. Note that I've removed the damaged section completely.

chassis-mounting holes on it. For added strength, mark the new bumper for two more holes, spacing them evenly between the originals. Drill each hole so that it's large enough to accommodate an 8-32 screw. Using the original screws and nuts, mount the new bumper on the front of the chassis, dull side up. Mark the chassis so that you can drill the additional mounting holes to match the ones that you made in the new bumper. Drill the holes with the same bit as you used to make the holes in the bumper, and countersink them on the bottom so that they'll take the same kind of 8-32 screws and nuts used on the outer corners.

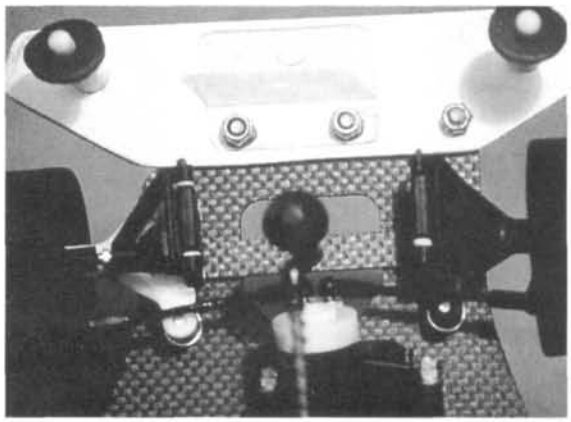
• **Step five.** Spread contact cement over the shiny side of the impact stiffener and the underside of the new bumper (where it will contact the stiffener). Let the cement set for 15 minutes, then carefully put the pieces together. (You'll only get one chance, so make it good!) Make sure that one long side of the stiffener butts firmly against the front edge of the chassis. Mark and drill the holes for the body posts, drilling through both layers of Kydex, and countersink them on the bottom for 8-32 screws. If you've done all this right, you'll have the same body-post pattern as you did before, and you won't have to drill any new holes in the body.

PROGNOSIS

You should now have a tougher, more resilient front end that will absorb impacts and last a really long time. The extra mounting holes prevent the bumper from putting all the impact stress on just the corners, and the stiffener spreads the shock of the impact over the entire front of the chassis plate.

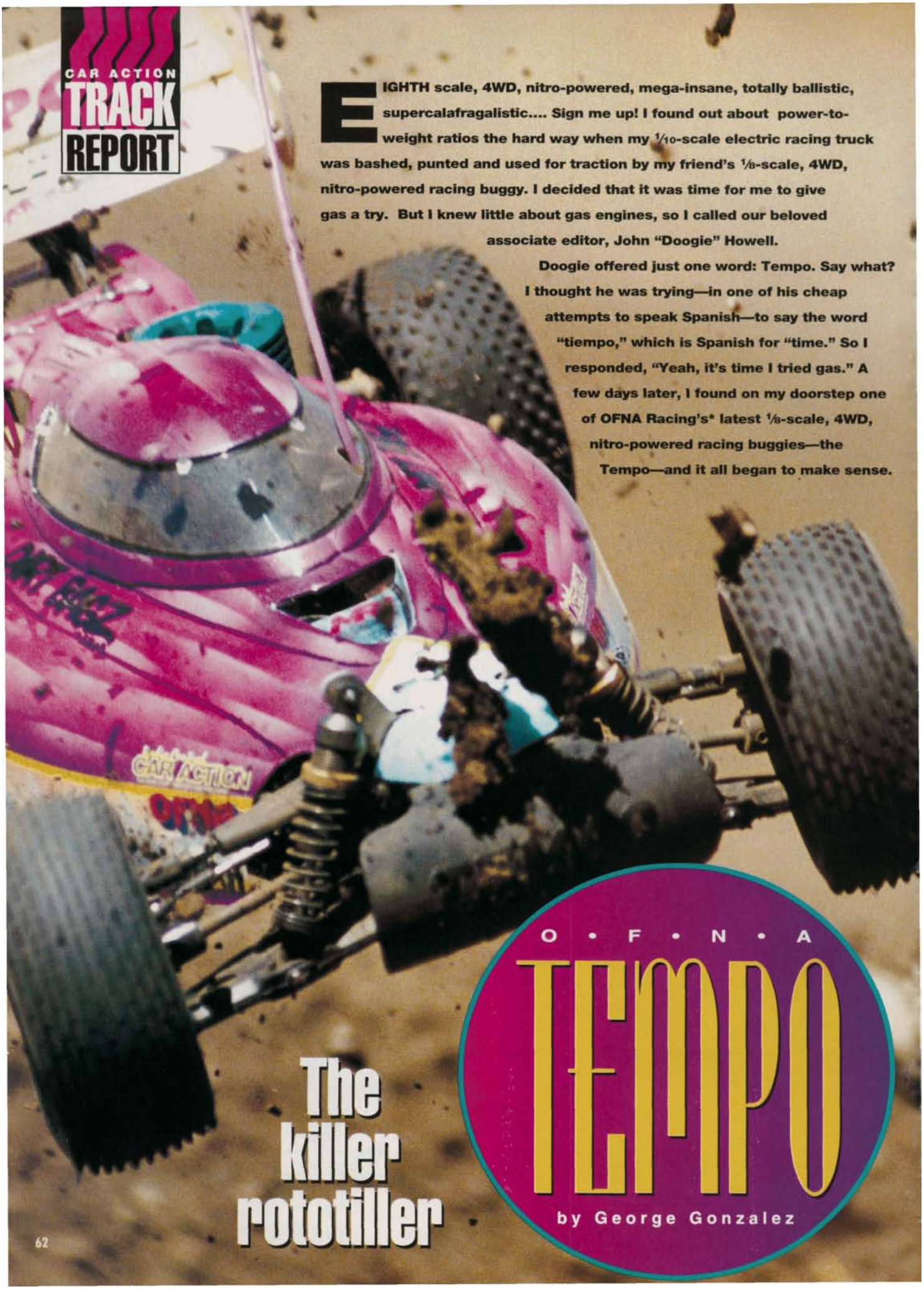
If you're starting with a damaged chassis, this method allows you to simply cut away the tattered part of the front corner, and use three mounting holes in the front instead of four. If the damage extends all the way back to the suspension-arm mounting holes, I'm afraid you're out of luck; you'll be in the market for a new chassis unless I figure out a way to fix that problem, too!

**Here are the addresses of the companies mentioned in this article:*
Associated Electrics Inc., *3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9337.*
Trinity Products Inc., *1901 E. Linden Ave., #8, Linden, NJ 07036; (908) 862-1705.* ■



From the top, you can see the two new mounting holes for the bumper. I no longer need the left-side mounting hole—which was broken—to attach the bumper.

CAR ACTION
TRACK
REPORT



The killer rototiller

O • F • N • A TEMPO

by George Gonzalez

EIGHTH scale, 4WD, nitro-powered, mega-insane, totally ballistic, supercalafragalistic.... Sign me up! I found out about power-to-weight ratios the hard way when my 1/10-scale electric racing truck was bashed, punted and used for traction by my friend's 1/8-scale, 4WD, nitro-powered racing buggy. I decided that it was time for me to give gas a try. But I knew little about gas engines, so I called our beloved associate editor, John "Doogie" Howell.

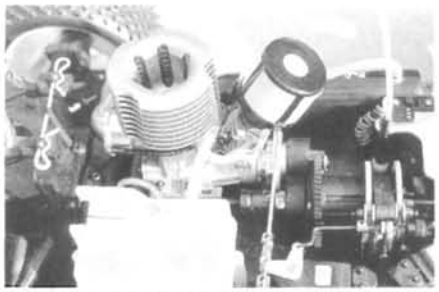
Doogie offered just one word: Tempo. Say what? I thought he was trying—in one of his cheap attempts to speak Spanish—to say the word "tiempo," which is Spanish for "time." So I responded, "Yeah, it's time I tried gas." A few days later, I found on my doorstep one of OFNA Racing's* latest 1/8-scale, 4WD, nitro-powered racing buggies—the Tempo—and it all began to make sense.

A GASSER FOR STARTERS

Throughout the U.S., 1/8-scale gas racing is becoming very popular, owing mostly to the "race-worthy," entry-level, 1/8-scale gas cars that many major R/C manufacturers now offer at affordable prices. At about $250 (after discounts) and 80 percent assembled, the Tempo is sure to attract first-time gas racers. And its race-proven features are sure to meet the demands of even the most discriminating expert racers.

JACK, BE NIMBLE; JACK, BE QUICK

The OFNA Tempo was designed to get first-time gas racers on the track quickly and easily. The complicated work is done for you; all that's left is the fun stuff, i.e., building the shocks, mounting the tires, installing the engine and the electronics. The kit includes a complete tear-down instruction manual, which comes in handy for maintenance. Although the Tempo comes nearly complete, I removed all the screws that made contact with metal and



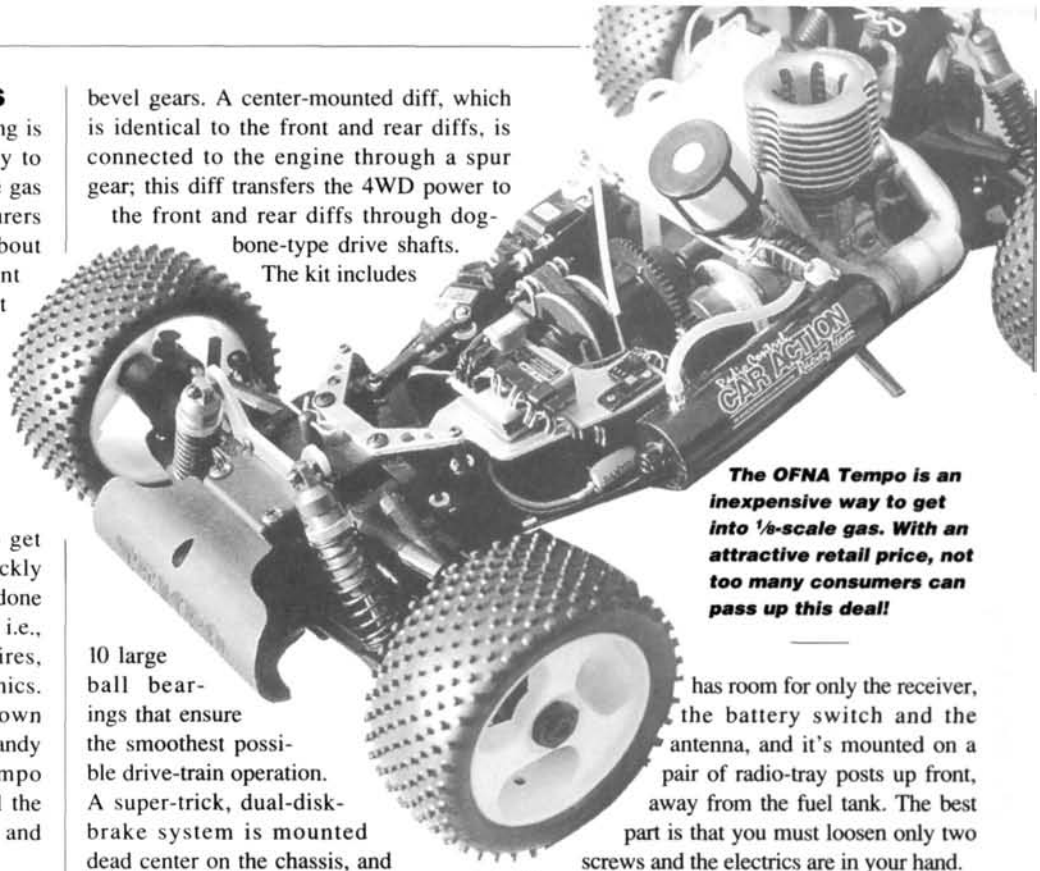
I opted to run an OFNA Brat .21 because it's a great starter engine and it comes with high-end features at a low retail price. I also used an OFNA .21 header, which leads to a Magic tuned pipe.

squirted some Red Loctite in the holes to prevent them from vibrating loose. (I strongly suggest that you do this.) Because I had disassembled the model almost completely, I decided to finish tearing it down so that I could study the mechanics of this sophisticated piece of machinery.

THE KIT

The chassis is heavy-duty, 1/8-inch-thick, black-anodized, 6061 aluminum. To provide extra strength and rigidity and to protect the engine and the drive train, the sides of the chassis plate are bent inward. Unlike those on most gas cars, the chassis is very wide and roomy.

The bulletproof drive train is based on a race-proven design: the easy-access front and rear bulkheads house exceptionally smooth, steel, mitre gear diffs with steel bevel gears. A center-mounted diff, which is identical to the front and rear diffs, is connected to the engine through a spur gear; this diff transfers the 4WD power to the front and rear diffs through dog-bone-type drive shafts. The kit includes 10 large ball bearings that ensure the smoothest possible drive-train operation. A super-trick, dual-disk-brake system is mounted dead center on the chassis, and it's attached to the center diff. Two large, fiberglass disk brakes can be adjusted individually to tailor the bias to your driving style, and they provide monster stopping power.

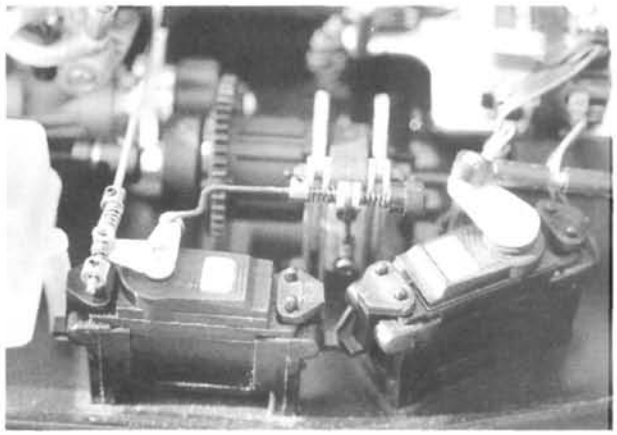


The OFNA Tempo is an inexpensive way to get into 1/8-scale gas. With an attractive retail price, not too many consumers can pass up this deal!

The Tempo has an uncluttered layout. The adjustable aluminum engine mount will accommodate just about any .21-size powerplant. The very trick, quick-fill fuel tank next to the engine is attached to the chassis with two screws. The servos (on the right side of the chassis) are mounted on a pair of unique, quick-release servo mounts. (I liked these servo mounts so much that I ordered two more sets for my other R/C vehicles.) The small aluminum radio tray has room for only the receiver, the battery switch and the antenna, and it's mounted on a pair of radio-tray posts up front, away from the fuel tank. The best part is that you must loosen only two screws and the electrics are in your hand.

RACING PARTS USED

Eight ball bearings	(TE-38)
Front universal-joint shaft	(TE-21)
Steel spur gear	(TE-14P)
Adjustable center diff	(TE-86)
Two steel spiral bevel gears	(TE-17P)
Two steel spiral pinion gears	(TE-19P)
Three-shoe flywheel	(TE-48P)
Three-shoe clutch nut	(TE-47P)
Clutch shoes and springs	(TE-78P)
Rear stabilizer set	(TE-63)
Hard double wing	(181W)
Foam air filter	(HN-170)



An Airtronics Pro Series 94152 high-torque servo handles the steering, and a standard 94738 servo controls both the throttle and the disk brakes.

The Tempo comes with a heavy-duty, dual-bellcrank steering mechanism with a single coil-spring servo-saver. Although it isn't mentioned in the instruction manual, you can adjust the tension on the servo-saver by adding washers to the brass sleeve that supports the coil spring. The bellcranks are secured with aluminum posts that attach to the chassis and to an aluminum top plate. A thick, steel steering rod connects the two bellcranks, and adjustable tie

rods with ball-type connectors are installed on the steering arms to minimize bump-steer.

SUPER SUSPENSION

The buggy's high-performance, 4-wheel, independent racing suspension will terrorize any terrain. Up front, a set of extra-long, glass-filled-nylon upper/lower A-arms are mounted on the bulkhead with easy-to-use, screw-on hinge pins. Each upper A-arm has a single, extra-thick, adjustable turnbuckle that allows hassle-free trackside camber adjustment. The axle carriers are secured to the upper/lower A-arms and provide approximately 20 degrees of caster. A set of hard-steel dogbones transfers the power from the diff outdrives to the axle carriers.

A set of hard-anodized, high-capacity oil-filled, coil-over shocks that will smooth out any terrain are mounted on a small, thick, aluminum shock tower. The shocks have partially threaded bodies, and this allows the shock collars to screw on for easy adjustment. The shocks also have double O-ring seals to ensure leak-free operation, and the rubber diaphragms that are installed on the shock caps help eliminate unwanted air bubbles. The shocks were easy to assemble, and the kit includes a variety of pistons so that you can fine-tune the damping. I chose the two-hole piston to start with, and I filled the shocks with 50WT Associated* pure silicone shock oil.

Like the front, the rear suspension uses upper/lower A-arms with adjustable camber link, and larger shocks are bolted on a tall aluminum shock tower. I used a one-hole piston for the rear shocks, and I filled them with 50WT shock oil, too. The rear A-arms provide a fixed 1.5 degrees of toe-in and 2 degrees of anti-squat; this is a good setup, but it doesn't allow you to make adjustments (unless you break out the Dremel.)

DIFFERENT SPOKES FOR DIFFERENT FOLKS

The light, one-piece, three-spoke wheels are bright yellow. They look really cool, and they're functional. They're offset inward to allow the use of longer suspension arms, which increase stability without increasing the car's overall width. The axle carries the mount well inside the wheel, and this reduces wheel scrub. The wheels are also designed to make tire mounting simple; a thin bead of CA mounts them securely. Because the Tempo is an entry-level buggy, it comes with bronze bushings instead of bearings for the axle carriers, but you can upgrade to bearings when your budget allows.

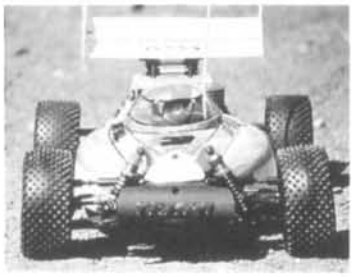
The kit includes a set of medium-compound, 11-row, spiked tires for the front and rear. They work best on soft to medium dirt, but you can cut down the spikes for more traction on harder surfaces. Because the wheels are the same size as those of the popular OFNA Pirate, you can choose from a wide range of tires.

The Tempo comes with a rugged Lexan buggy body and wing that definitely fall into the love-or-hate category. The body is just too round for my taste; it looks like something from "Lost in Space"; but after Air Works* had given it a "Museum of Modern Art" paint job, I suddenly liked it.

REAL RACING EQUIPMENT

After I had reassembled the car (making sure not to skimp on the thread-lock), it was time to mount the engine and the electronics. I chose a Brat* .21 engine because it's a great starter engine and it comes with high-end features at a low-end price. The engine has a slide-valve carb, a huge sink head and enough power to make your head spin. The exhaust is routed through an OFNA .21 header, which is mated to an OFNA Magic tuned pipe.

OFNA TEMPO



Manufacturer	OFNA Racing
Type	4WD electric
Scale	1/8
Price	$325.95

DIMENSIONS:

Overall length	17.75 in.
Width	13 in.
Wheelbase	12.25 in.
Front track	11.50 in.
Rear track	11.50 in.

WEIGHT:

Gross (with battery and full fuel tank)	7 lb., 14 oz.

CHASSIS:

Type	Aluminum plate

DRIVE TRAIN:

Type	4WD
Primary	Pinion (clutch bell) and spur
Differential(s)	Mitre gear (3)
Bearings/Bushings	8 bushings (wheels)

SUSPENSION:

F/R: Type	Molded spoke
Damping	Oil-filled, coil-over shocks

WHEELS:

F/R: Type	Molded spoke
Dimensions (DxW)	4.125x 1.75 in.

TIRES:

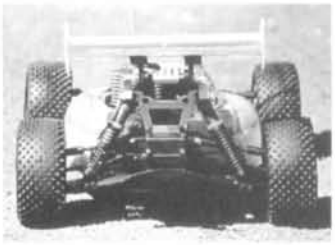
Front/rear	TE-40P soft mini-spike

POWERPLANT:

Engine	Brat .21 modified*
Pipe	OFNA Magic pipe*
Carb	Brat slide valve*

*not included

OPTIONS TESTED:
Airtronics Caliber 3P, 94152 servo, 94738 servo; Novak NER-3FM receiver; PTI 5-cell, 600mAh battery pack; Brat .21 modified engine; OFNA TE-53S manifold, TE-58P tuned pipe.



HITS
• Extra-rugged chassis • Trick dual-disk-brake setup • Quick-fill fuel tank • Quick-release servo mounts • Universal engine mounts • Layout allows easy maintenance.

MISSES
Caster and rear toe-in aren't adjustable • Instructions for rebuilding aren't clear.

My trusty Airtronics* Caliber 3P commands a Novak* NER-3FM receiver, which is mounted on the radio tray with double-sided tape and secured by a large tie-down strap. An Airtronics Pro Series 94152 high-torque servo controls the steering, and a standard 94738 servo controls the throttle and the disk brakes. I mounted a PTI* 5-cell, 600mAh battery pack directly on the chassis plate using double-sided tape and shoe glue.

TRACK TIME

I grabbed my gear and made a dash for the track. When I arrived, I was greeted by my friends and fellow contributors, A.R. Flatbush and Wally Cahill, and they were looking to race their own nitro terrors. With an added section (which I call the

If you're looking for an inexpensive way to get into 1/8-scale gas racing, but you don't want to sacrifice performance or reliability, there's an OFNA Tempo with your name on it.

side stretch), the new L-shaped track is much larger than, but just as brutal as, the old one. I had the honor of being the first to do a track report.

I had broken in and fine-tuned the engine (and made every possible mistake), so I was ready to rock. I filled the tank with O'Donnell* 20-percent-nitro fuel and placed the car on an OFNA Racing starter box. The Brat engine fired up on the first try and revved to a steady idle. It was all systems go, and my blood pressure rose as I set the car on the track.

I took a few slow laps to get all my trims in order and to get a feel for the track. Then, with a sudden burst of confidence, I punched it. Yeeoow! Talk about roost potential! This car was gone in a cloud of dust.

The Tempo hit the high-speed sweeper and excavated about 25 pounds of dirt and small rocks in the process. It screamed out of the sweeper and down the first straightaway. The first tabletop jump was dead ahead, and I wasn't slowing down for anything. Check your baggage, folks, 'cause we're flying the friendly skies. The Tempo cleared the second jump by a mile and landed on the next right turn. Then came an even longer straightaway, followed by an even larger tabletop jump. (I told you this track was brutal.) The Tempo rocketed down the second straightaway and plowed

(Continued on page 124)

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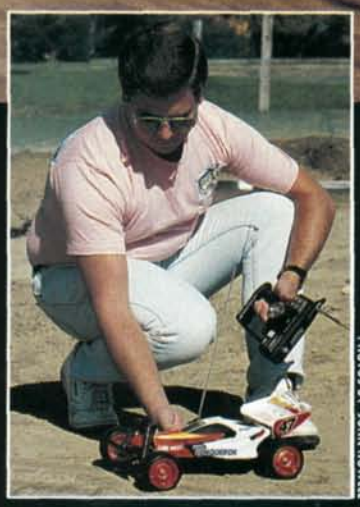
CAR ACTION TRACK REPORT

TAMIYA TERRA CONQUERER



PHOTOS BY JOHN HOWELL

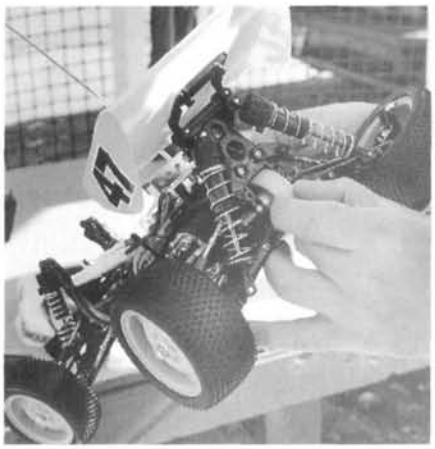
ATTILA THE FUN!

by PAUL ONORATO

I'VE ALWAYS LIKED all-wheel-drive vehicles, and the 1/10-scale Tamiya* Terra Conqueror is no exception. In my mind, 4WD trucks and cars are unstoppable. Although I hadn't touched a 4WD vehicle in years, I jumped at the opportunity to write the track report on this off-road racer! The impressive 4WD Terra Conqueror has the potential to be a serious competitor, and it has much to offer intermediate R/C enthusiasts.

THE KIT

I was surprised that the kit had so few parts; I had expected many more because the Terra Conqueror requires two gearboxes. The parts are well-marked in plastic bags and on parts trees. Even though the kit is a little pricey (the suggested retail price is $396), the features that I would instantly purchase as options come stock.



It's super easy to get at the Terra Conqueror's twin ball differentials in case of an emergency. Trick access hatches pop off with the removal of a few screws.

A Dynatech 01R motor, rated at 22,000rpm, provides plenty of power for intermediate racers, and it's a great improvement from the 540 Mabuchi that Tamiya kits usually include. Unlike the Mabuchi, the Dynatech 01R has changeable brushes and timing adjustments. A mechanical speed controller with BEC controls the motor.

I usually invest in ball bearings because the plastic bushings that some kits include have a very short life. The Terra Conqueror already includes ball bearings for the two ball differentials. I prefer ball diffs to gear diffs because they provide smoother running during hard driving.

Tamiya's Dyna Tech 01R motor comes with the kit. This motor features changeable brushes and adjustable timing—a vast improvement over the stock 540s found in most Tamiya kits.

The suspension uses oil-filled, coil-over plastic shocks. For damping, you may use a piston with either one, two, or three holes. The instructions recommend that you use the two-hole piston—the setting between hard and soft damping. Spring tension can also be adjusted by adding or removing spacers of different sizes.

You can adjust camber and steering by using turnbuckles that have opposite threads at the ends. The turnbuckle's right-hand thread is scored so that you can distinguish it from the left-hand thread. This allows you to adjust camber or toe-in without taking the tie-rods off the car. All it takes is a turn of the wrench that's supplied in the kit.

I decided not to use the stock spike tires intended for loose dirt. Instead, I opted for a set of Pro-Line* Fuzzies to suit the terrain I'd be driving on.

GETTING IT TOGETHER

As with any model kit, you must read the instructions carefully. Tamiya kits include clear instruction manuals, and this kit is no exception. Careful attention is still required, however, because it's very easy to install a piece backward, upside-down, or in the wrong position. If you match each part to

TAMIYA TERRA CONQUEROR

Scale 1/10
Price $396

DIMENSIONS:
Overall length ..... 15.5 in.
Wheelbase ..... 10.75 in.
Front width ..... 9.5 in.
Rear width ..... 9.5 in.

WEIGHT:
Gross (with battery) ..... 3 pounds, 9 ounces

CHASSIS:
Type ..... One-piece tub
Material ..... Plastic

DRIVE TRAIN:
Type ..... Sealed gear
Primary ..... Pinion/spur
Differential(s) ..... Ball differentials
Bearings/bushings ..... Bearings

SUSPENSION:
Type (f/r) ..... Independent A-arm with upper control link
Damping (f/r) ..... Oil-filled, coil-over shocks

WHEELS:
Front: Type ..... One-piece molded
Dimensions (DxW) ..... 2.2x1.1 in.
Rear: Type ..... One piece molded
Dimensions (DxW) ..... 2.2x1.4 in.

TIRES:
Front/rear ..... Spike

ELECTRICS:
Motor ..... Dynatech 01R
Battery ..... None
Speed controller ..... Mechanical

OPTIONS TESTED:
Futaba* FP-2PBKA transmitter and receiver; Pro-Line Fuzzies ultra tires.

HITS
• Easy motor and ball-diff access • Ball bearings • Excellent handling and acceleration • Powerful stock motor

MISSES
• Steering rods too short • Battery difficult to reach

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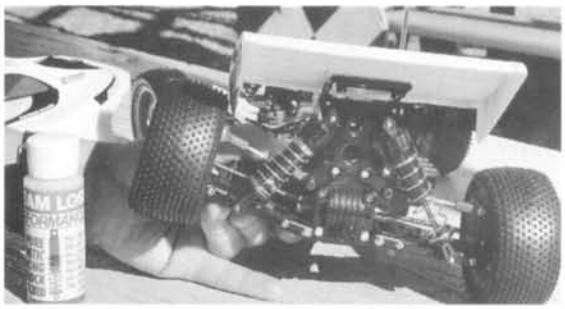
the full-size schematic, your Terra Conqueror should be correct on the first try.

I use a muffin tin to separate screws and small parts, and I do my building on a terry-cloth rag so that the parts won't roll away. From beginning to end, my car went together very easily. There was no need to refit any parts.

The first step—constructing the front and rear differentials—is probably the most difficult. Pay close attention to the instructions. Many of the parts look alike and could be assembled in more than one way. It's crucial to build the diffs properly, or else you'll have trouble later on. After the first step, the rest is all downhill.

Before you install the turnbuckles, make sure that you pick up the correct size. The steering rods and the upper arms look alike. I mistook one for the other. I couldn't figure out why my tires weren't parallel, and then I realized that the turnbuckles were of different sizes. After I had correctly installed the steering rods, I found that they weren't quite long enough. Very little of each rod is actually inside the rod-end. I can see them stripping right out during a race.



The Terra Conqueror's oil-filled shocks and long suspension arms provide a smooth ride over the roughest surfaces. Plastic shocks come standard, but you can easily upgrade to metal ones.

Lightweight, one-piece wheels go on all four corners of the Terra Conqueror. I used a full set of Pro-Line's Fuzzie tires to tame my local track.

For the paint job, I decided to go with the box art. It looked cool, and I wanted to use the kit's decals. The painting and the placing of the decals were a little difficult. I usually paint my bodies, and I figured that this car would be like any other. Wrong! Masking the line between the orange and white was very hard. Also, aligning the decals was difficult. To do a good job, you need a lot of patience. If you don't usually paint your bodies, I recommend that you don't start with this car.

AT THE TRACK

Before I ran the car for the first time, I didn't know what to expect. I wasn't familiar with the Dynatech 01R or with driving an off-road 4WD car. Without a doubt, I was impressed by the Terra Conqueror's performance. With the first blast of power from the motor to each wheel, I was hooked on 4WD. Entering turns at full speed didn't seem to bother this car. The Pro-Line Fuzzies hooked up very well with the dirt track and helped the car to negotiate the corners. The car is very sure-footed. I didn't roll it once, although it's possible to do so.

The mechanical speed controller responds quickly; after only a touch of the throttle, the car was at full speed. There is a problem with the cover supplied with the kit. A square piece of Lexan with openings for the wiring is supposed to protect the component, but after I had run one battery pack, the contacts were loaded with dirt. This cover should be redesigned.

I would also add a decent set of shocks. The stock ones are OK, but they don't supply enough absorption; when the car hits large dirt mounds, it flies well, but the landings are a little rough.

I was very pleased with the Tamiya Terra Conqueror. If you're interested in getting into off-road and you don't want to start out with a car that will require countless upgrades, the Terra Conqueror is for you. When you're ready to move up and race the car competitively, it can take many modifications.

**Here are the addresses of the companies mentioned in this article:*
Tamiya America Inc., *2 Orion, Aliso Viejo, CA 92656; (714) 362-2240.*
Pro-Line USA, *P.O. Box 456, Beaumont, CA 92223; (714) 849-9781.*
Futaba Corp. of America, *4 Studebaker, Irvine, CA 92718; (714) 455-9888.* ■

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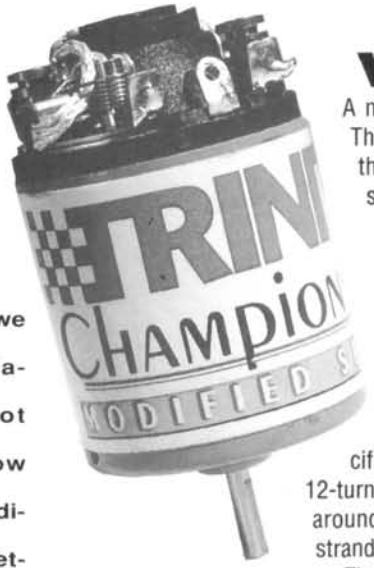
MOTOR TIPS

TRINITY'S NEAL McCURDY TALKS BASICS

by JOHN HOWELL



SOMETIMES, here at *Car Action,* we get caught up in all the hulla-baloo, and we forget that not everyone knows all there is to know about electric motors—especially modified motors. We constantly receive letters from loyal readers asking which would be the best motor or wind for this, that, or the other application. Most want to know more about proper procedures for breaking in, gearing and cleaning modified motors. Understanding motors is a tricky business, but when you've got the hang of the basics, it's smooth sailing from there on out. To shed some light on this somewhat confusing subject, I called Neal McCurdy—Trinity's team manager, to talk about some motor know-how.

WIND ME UP

A motor's wind is its single most important feature. The armature, in the case of R/C car motors, has three poles that protrude outward from its center shaft. The flat, center part of the pole makes up what's commonly referred to as the "web" of the armature. The web is the area on which the wire strand (or strands) is wound. "Single," "double" and "triple" refer to the number of wire strands that are wrapped around the armature's poles. For example, a double has two strands of wire wrapped around each pole; a triple has three.

Each strand is wrapped around the web a specific number of times. For example, each pole of a 12-turn single's armature has one strand of wire wrapped around it 12 times, whereas a 17-turn triple has three strands of wire wrapped around its poles 17 times.

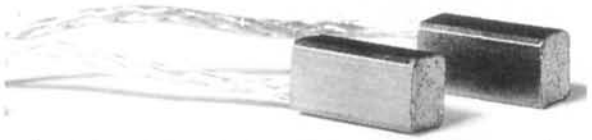
There are a few things to remember about motor winds. The fewer the turns on the armature, the faster the motor is, but this is also harder on your battery. Motors with more wire turns provide longer run times, and although they have less overall speed, they produce more torque and are generally easier to drive with.

Here's a head-on view of the armature's three poles protruding outward from the shaft. Wire is wrapped around these three poles and then attached to the commutator segments.

The bigger your motor's overall wire gauge, the more efficient it will be. Generally, the smaller the wire gauge, the more turns there will be, and vice versa. So a 16-gauge single will be more efficient than an 18-gauge single. The downside of having a big-wire motor, e.g., a 13-turn double with 19-gauge wire, is that it's more difficult to gear properly. This is because a big-wire armature that's over-geared will draw more current than a small-wire armature will. When the motor draws more current, your batteries will dump much more quickly.

It takes more work to find the proper gearing, but it's worth it in the long run because the motor will give you a faster car with more run time. The more efficient your motor is, the easier it is on your batteries.

· SPRING ME ·



- **BRUSH-SPRING SETUP. One of the most easily forgotten areas on a modified motor is its brush-spring setup. For general applications, the spring that comes with your motor should work well. Sometimes, though, the stock spring doesn't cut it. Basically, light springs increase rpm, and heavy springs give your motor more torque.**
- **CURRENT DRAW AND RPM. The more current your motor draws and the more rpm your motor makes, the stronger the spring you'll need. For example, low-current applications, such as 1/12 scale, will use lighter springs because of the low average current the motor draws.**
- **BRUSH SIZE. The type of brush or its grade also affects your spring selection. If you use a silver-compound brush, you can use a spring with a lighter tension than you'd use with a copper-alloy-type brush.**
- **SIZING UP. Another variable that affects the choice of spring tension is brush contact area—how much of the brush's surface actually touches the commutator. With a half-cut brush, you can use half the spring tension and still get the same contact pressure per square inch with one fourth the friction.**

GEAR TO GO

When it comes to selecting your gear ratio, there are many variables, and nothing beats experience. Batteries, car setup, tire size, track conditions and driving styles all play a major role. But if you're interested only in gearing for racing, here are a few pointers.

• Check with other racers and see which gear ratio they use. Try it, and see how it works for you. It might not be the one you need, but it's a good way to get on the right path to correct overall gearing.

• Make a trial run—for four, five, or eight minutes, depending on what you race—then check to see how much time is left in your battery pack. Do this by using a discharger that you can set to a current that's similar to the current you actually draw on the track, such as 30 amps in a four-minute race (a general application). You can do this on a Competition Electronics* Turbo Thirty charger/discharger. If you don't have one and can't borrow one, round up a bulb discharger, see how long it takes to dump your batteries, and experiment to see what you have left. What you have left shows what happens on the track. Ideally, your batteries should last for approximately the length of your race plus the time it takes you to run one lap. As an added safety margin, it's a good idea to add a few seconds to this formula. If you need to gear up, add one tooth at a time until you reach the optimum ratio; remember, make only small changes, incrementally. You'll soon be able to relate what you have left in your pack to what happens on the track and will be able to adjust your gearing accordingly.

• Check your motor. If the comm or brushes are burned, perhaps your gearing is too high. Rebuild your motor then gear down.

• When you get to a track you're unfamiliar with, start with low gearing then work your way up.

• As a rule of thumb, remember that tracks with a lot of turns and high bite (carpet, off-road tracks) require lower overall speed, so they require lower gearing. Tracks with fewer turns and much longer straightaways, such as concrete ovals that run high mph, require higher gearing to reach those speeds.

• If a gear ratio works for others, it might not work for you. Your driving style is one of the biggest influences on your run times. For example, if you're hard on the trigger, your batteries will dump sooner than those of someone who isn't. If you gear down to avoid early dumping, you'll go more slowly, and you'll try to compensate for this by using more throttle; and you'll dump even sooner. It's a common mistake, so be aware of it.

BRUSHING UP

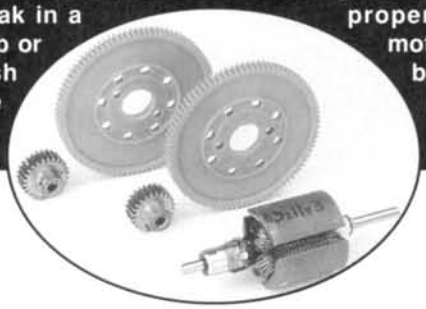
The brushes used in R/C car motors are usually made of a combination of copper, graphite and sometimes silver. The amount of these materials used in a specific brush varies greatly from manufacturer to manufacturer and from one brush grade to another. Their formulas are highly secret. To prevent others from copying their speed secrets, manufacturers rarely reveal the composition of their brushes.

Brushes are generally divided into two categories: silver-copper-graphite alloys and copper-graphite alloys. The silver-copper-graphite alloys are found mostly in the better, high-performance brushes, and the copper-graphite alloys are usually found in economy brushes. Silver brushes usually produce more horsepower and have less friction. But they're more easily damaged by overheating (brought on by over-gearing) because they're more prone to oxidation (silver can oxidize at lower temperatures), and oxidation increases the resistance of any brush. There are some applications for which silver brushes may not be suitable. These include racing that demands heavy current, i.e., some forms of off-road, such as 7-cell truck, and 4WD, 1/10-scale on-road and 7-cell dirt oval. A copper-graphite or low-silver-content brush is better for these.

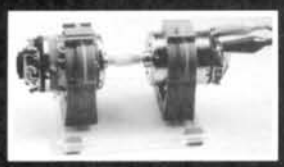
Bear in mind that the percentage of metal, i.e., silver or copper, in a brush will affect its performance. Typically, a brush's metal content ranges from 35 to 80 percent. "Hard" brushes have a metal content of 70 to 80 percent; "soft" brushes have 35 to 50 percent. High-metal-content brushes produce more horsepower, but they're harder on the commutator. Softer brushes, i.e., those with a high *graphite* content are easy on comms and can be broken in quickly, but they produce less horsepower.

MOTOR BREAK IN

Everyone says they know the *absolute* best way to break in motors. After years of experience, Neal thinks he has found the most convenient way to break in a motor properly. He puts a drop or two of Trinity/Revtech Brush and Comm Drops on both the brushes, then he runs the motor at 5 volts for 20 to 30 seconds for oval racing and two to three minutes for roadcourse racing. He then dynos the motor to ensure proper performance and to obtain motor rpm for gearing. After that, before putting the motor into a racecar, Neal adds a few more drops to reduce comm damage.



BREAK-IN TIPS



- Soft brushes can be broken in more quickly than hard ones—less break-in time.
- Before you replace the brushes and break in your motor, make sure that your comm is in good shape. Its surface should touch as much of the brush as possible. It shouldn't be scratched or grooved.
- Be sure that your springs aren't worn out. If they've been exposed to high temperatures, they might be worn out and have lost tension.

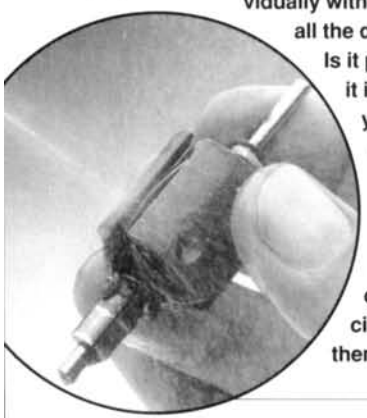
MOTOR MAINTENANCE

A common question is: when do I rebuild my motor? "Easy," says Neal; "When it doesn't go as fast as it used to."

"For ultimate consistency, we [Trinity's race team] rebuild our motors after every heat we race. As for the average person, it depends on your racing or driving conditions. If you're racing at a local club, you can go for a month without rebuilding your motor. It also depends on your competition. If your buddy is tearing down and rebuilding his motor all the time, you might want to do the same so that he doesn't always have the advantage."

Certain motors have to take more abuse. "Off-road racing is less demanding on a motor than on-road or superspeedway is," adds Neal. "Sure, off-road is dirtier, but the motor has to do less work. Racing 1/12 scale is also pretty easy on motors, so they can go longer between teardowns as well."

What about basic cleaning? Is there a best way to clean a motor? "There's really no specific best way," says Neal. "If you're going to tear it down completely, clean each part individually with motor spray and a soft cloth to remove all the debris. At this point, look at the comm. Is it pitted, burned, or heavily scratched? If it is, you need to have your comm cut. If you're having it cut, while you're at it, I also recommend that you have it rebalanced. If you aren't going to tear your motor down, and your comm is in pretty good shape, clean your brushes with motor spray and a soft cloth, spray out the brush hoods (especially if you run off-road), reassemble it, then put a drop of oil on the bearings."



CAPACITORS

As your motor operates, it emits a pulse of electrical noise that can affect your radio. It's similar to when there's a lightning storm near your house and you get bursts of static on your TV, or when you hear ignition noise over your car radio. Capacitors are designed to suppress this radio noise and prevent it from going any farther than the motor.

When asked about capacitors, Neal had this to say: "I usually use two .1-microfarad, 50V ceramic capacitors on my motors, and I solder them—one from the positive terminal to the can, and the other from the negative terminal to the can. I've seen people run as many as four capacitors, but it's really unnecessary. You could even get away with using one. People with AM radio systems should run two or three capacitors, and people with FM systems should run at least one, if not two."

WHICH MOTOR IS FOR ME?

We constantly get letters asking which motor is best for on-road, off-road, drag racing, or truck racing. Well, here's the deal. We're going to tell you what winds work best for specific R/C applications.

CAR SCALES / MOTOR TURNS	17	16	15	14	13	12	11	10	9	8	7
1/10 on-road—4 min.					•	•	•	•			
1/10 oval—4 min.			•	•	•	•	•	•			
1/12 on-road—8 min.; 6-cell	•	•	•	•							
1/12 oval—5 min.; 6-cell			•	•	•	•					
1/12 carpet—8 min.; 4-cell			•	•	•	•	•				
1/10 off-road—4 min.; 6-cell		•	•	•	•	•	•	•			
1/10 truck—4 min.; 7-cell	•	•	•	•	•	•					
4WD dirt oval—4 min.; 7-cell				•	•	•	•	•			
2WD dirt oval—4 min.; 7-cell			•	•	•	•	•				
1/10 sprint car—4 min.; 7-cell				•	•	•					
Drag Racing							•	•	•	•	•
Pulling						•	•	•	•	•	

Thanks to Neal McCurdy of Trinity for all his time and help with the preparation of this article. I hope it will help you to understand the basics of modified motors. Stay tuned for Part 2, in which we'll look at everything you need to know about stock motors.

**Here's the address of the company mentioned in this article:*
Competition Electronics Inc., *3469 Precision Dr., Rockford, IL 61109; (815) 874-8001.* ■

Photos by Rick Schwartz

PROCAR Southern Nats

by RICK SCHWARTZ

Go for the dough...

The PROCAR Southern Nationals—the third and final event of PROCAR's inaugural series—was held at Lake Whippoorwill International Speedway on Labor Day weekend. Racing at Lake Whippoorwill is always a blast! It's one the best layouts in the country, and owners Bob and Yvonne Hosch provided a totally organized event.

Jeremy Gottardi of Vineland, NJ, was the Grand Prize winner of the Trinity/R/C Car Action Sweepstakes. He got to spend the weekend at the Whip with his new buddy, Joel Johnson.

SPORTSMAN MAINS

The fun began after the smoke had cleared from the last qualifier and the drivers had set their strategy for the Mains. The Sportsmen were the first to go. True to his TQ form, Shannon Moore set the pace. He was taken out on the 26th lap, but he came back to finish strong and took the checkered flag with 41 laps in 4:00.66. This was

Shannon's first PROCAR National win, and he went home with a broad smile and a gift certificate for $500. Shannon says that "some tips from *R/C Car Action*" helped him to win and that he plans to stay in the Sportsman Class if possible. Second place went to Craig Martin, and William Draper placed third.

FORMULA AMERICA MAINS

The Formula America racers were up next. A first-place finish would net the winner $750. Frank Polimeda led the pack and turned consistent sub-5.2-second laps. Disaster hit on the 20th lap, and he dropped back to finish eighth. TQ'er Jeff Irish planned his race from the start. He said, "They were pushing me too fast, so I decided to drop and go." It worked! He saved his horsepower for the end and won with 45 laps in 4:02.59. Jeff told me that he would use his winnings to go to the PROCAR Worlds.

PRO SERIES MAINS

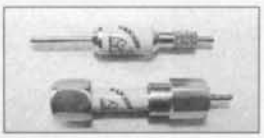
The Pro Series Mains were set up a little differently. The top four drivers from the C-Main moved up into the B-Main, and the top two finishers in the B-Main moved up to fill the last two slots in the A-Main. Ernie Bucci, Craig Perry, Andy Dobson and Tyree Phillips all moved to the B-Main, but that was as far as they got. Mike Blackstock and Chad Mears were first and second in the B-Main and moved up to the A-Main to complete the field.

This was it! The big bucks—$1,200 for first place! All the preparation was over, and it was as simple as ready, set, go. TQ'er Neisinger took off like a shot and

New in the pits

CANNON APPLIED MOTOR SCIENCES

offers two new items to improve your motor's performance. The first item pre-seats your brushes without adding wear and tear to your commutator. Just put it into a modified can and insert the new brushes and springs; turn it



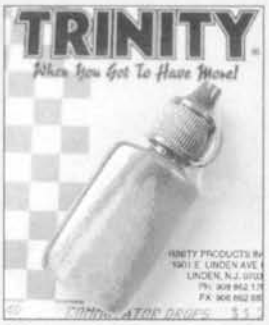
slowly and it will contour the brushes to the commutator. It's made of stainless steel and should last a long time.

The second is a heavy-duty motor-bearing press that makes removing worn bearings from modified cans simple and easy. It's better to replace a bearing than to buy a new motor. The stainless-steel press is designed to be a real workhorse.

Morry Mears, Cannon Applied Motor Sciences, 106 Wheeler Rd., Seffner, FL 33584; (813) 654- 3452.

TRINITY

Todd Putnam, Trinity's Team Coordinator, showed me a grab bag of new products. Trinity's new Commutator Drops, primarily for stock racing, fully seats new brushes in 20 to



30 seconds.They also help to eliminate excessive comm wear. You apply the drops to the back of the seat hood.

In conjunction with the comm drops, a laydown hood conversion allows you to convert your existing stock or mod motor to

this new brush configuration; this will give you more commutator wrap. This translates into more horsepower because each pole will fire for a longer duration. The system is used on the Slot Machine II.

The new EX Series motors drew the most attention. They were derived from experimental Trinity motors used by the racing team. They've been totally reworked with new armatures, endbells and superior-grade magnets. The new material for the comm increases the magnetic field, and a keyed brush hood for the endbell eliminates the need for realignment after dismantling.

Additional new items include light parts for the Evolution 10 SS, large-volume shocks, a sway-bar kit, hubs and a motor-mount plate. With all these new goodies for the EV10 and EV10 SS, better handling and faster times can be bolted on in no time.

Trinity Products Inc., 1901 Linden Ave. #8, Linden, NJ 07036; (908) 862-1705.

BOLINK

Bolink has a new body—a 1993 Pontiac. Its improvements include an adjustable rear spoiler and roof rails, which improve stability.

Bolink R/C Cars Inc., 420 Hosea Rd., Lawrenceville, GA 30245; (404) 963-0252.

A dream come true

It's the big race! You're in the pits, and none other than Joel Johnson is tweaking your car. You have the best equipment and the best technical support available. It's the third qualifier, and even though this is the first time you've competed in concrete-oval racing, you're still in the A-Main.

Sound too good to be true? For most of us in the R/C world it would be, but Jeremy Gottardi, of Vineland, NJ—the Grand Prize winner of the Trinity/*Car Action* Sweepstakes—received a trip to Lake Whippoorwill International Speedway in Orlando, FL, to compete in the PROCAR Southern Nationals; a Joel Johnson-built Evolution 10ss; Trinity batteries; a Tekin 411G speed controller; TRC ProLite radial tires; and, best of all, the opportunity to pit with Joel for the entire weekend of racing.

I visited Jeremy in the pits and found that he was receiving support not only from Joel, but also from the entire Trinity crew. Jeremy and Joel ran 12 to 15 practice heats to prepare for the qualifiers. It must have worked, because through the third qualifier in the Sportsman Class, Jeremy was in the top 10. He told me that the first couple of times he ran, his hands were really shaking, but taking lessons from the best there is gave him the confidence he needed to calm down and run some competitive lap times.

Jeremy was bumped into the B-Main after the last qualifier. He went on to finish fifth, and he showed that with some practice, he could become an accomplished oval driver. As the weekend came to a close and goodbyes were said, Jeremy told me that this really had been a dream come true, and that the new friends that he had made were the best part.

RACER INFORMATION-PROCAR SOUTHERN NATIONALS

Pro Series A-Main

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Tires	Sponsors
1	6	Chris Doseck	Trinity	Cam	Cam	Tekin	TRC	Cam, TRC, Tekin, BRP, Trinity, KO Propo
2	2	Mike Boylan	Trinity	Trinity	Trinity	Novak	TRC	TRC, Trinity, Novak, Protoform
3	4	Ralph Burch	Hyperdrive	Cam	PTI	Tekin	TRC	Hyperdrive/PTI, Cam, Futaba, Tekin, Tecnacraft, Du-Mor, TRC, Protoform, BRP, Competition Electronics
4	10	Mike Blackstock	Trinity	Trinity	Trinity	Tekin	TRC	Trinity, Tekin, TRC, Futaba, Magic Motorsports, Speedworks, Point Blank
5	5	Jim Fuller	Trinity	Trinity	Trinity	Novak	TRC	Trinity, TRC, Novak, Bolink
6	8	Ricky Jordan	Bolink	East Coast	Voodoo	Tekin	TRC	Bolink, East Coast, Voodoo Batteries, Futaba, Tecnacraft, Kimbrough
7	7	Shane Kocher	Trinity	Trinity	Trinity	Novak	TRC	Trinity, TRC, Novak, Futaba, Protoform
8	1	Tony Neisinger	Trinity	Trinity	Trinity	Tekin	TRC	Trinity, Point Blank
9	3	Joel Johnson	Trinity	Trinity	Trinity	Novak	TRC	Trinity, TRC, Novak, Magic Motorsports, Point Blank, Speedworks
10	9	Chad Mears	Associated	Reedy	Voodoo	Novak	TRC	Associated, Reedy, Novak, Competition Electronics, Parma/PSE, Bolink, Matrix

Formula America Class

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Tires	Sponsors
1	1	Jeff Irish	Comp. Craft	Lightspeed	Lightspeed	Novak	TRC	Lightspeed, Composite Craft, Vantage Engineering, Bad Dog
2	3	Troy Desmarais	Associated	Twister	Voodoo	Novak	TRC	Twister, Protoform, Voodoo
3	7	Rob Cutman	Trinity	East Coast	Hot Shot	Novak	TRC	East Coast Motors, Hot Shot Cells, Novak, TRC, Composite Craft, Bolink
4	2	Paul Schaub	Associated	Cam	Sanyo	Tekin	TRC	Cam, Protoform, Team Smooth, Cannon
5	8	Mike McBride	Associated	Cam	Sanyo	Tekin	TRC	Team Smooth, Associated, Cam, Twister, Tekin
6	9	Chuck Massey	Associated	EPIC	Sanyo	——	BSR	Strike Force Motors, BSR tires, Protoform
7	5	Scott Law	Trinity	BRP	Power Push	Novak	TRC	BRP, Power Push, Trinity, Novak, Bolink, Jaco, Du-Mor R/C, Team DuraTrax
8	6	Frank Polimeda	Trinity	Trinity	Trinity	Tekin	TRC	Composite Craft, Protoform, Trinity, Tekin, Vantage, Jaco
9	10	Danny Shaw	HPI	EPIC	Voodoo	Novak	TRC	Cannon/Bad Dog, Protoform, Voodoo, HPI, Mighty Motors
10	4	David Davis	Associated	EPIC	——	Tekin	BSR	Strike Force Motors, Associated, BSR tires, Bolink, Tekin, HPI

Sportsman Challenge Class

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Tires
1	1	Shannon Moore	Associated	PROCAR	Sanyo	Tekin	TRC
2	3	Craig Martin	Associated	PROCAR	Sanyo	Novak	TRC
3	6	William Draper	Associated	PROCAR	Sanyo	Tekin	TRC
4	8	Howard Baird	————	PROCAR	Sanyo	——	——
5	5	Jim Vaughn	Comp. Craft	PROCAR	Sanyo	Novak	TRC
6	9	John Pizzulo	Associated	PROCAR	Sanyo	Tekin	TRC
7	7	Spencer Sinsabaugh	Associated	PROCAR	Sanyo	Novak	TRC
8	10	Don Theriault	Trinity	PROCAR	Sanyo	Tekin	TRC
9	4	Tony Baldwin	Associated	PROCAR	Sanyo	Tekin	TRC
10	2	David Jones	Trinity	PROCAR	Sanyo	Tekin	TRC

was followed by Joel Johnson until the 17th lap, when Tony's car was bumped, spun and launched over the wall. Fortunately, no one was hurt. The spectacular crash ruined Tony's chances for the big money, however, and it took out most of the racers who were fighting for the lead. As the race wound down, Chris Doseck came out of the pack. Again, the strategy of saving the power for the end worked, and he won going away—the only driver to turn 45 laps with a time of 4:03.75. Chris, who finished seventh at the PROCAR Mid-America Nationals, told me that he had planned all weekend to lie back and pump it up at the end. Mike Boylan finished second, and Ralph Burch took third place. ■

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N-600AA	AA	600	.543	1.945	$ 1.99
N-650SC	1/2SUBC	650	.866	1.016	$ 3.99
KR-1300SC	SUBC	1300	.866	1.654	$ 2.99
KR-2000C	C	2000	.992	1.929	$ 5.99
KD-4400D	D	4400	1.272	2.362	$ 9.95
HIGH CAPACITY					
KR-600AE	2/3A	600	.650	1.094	$ 3.49
KR1800SCE	SUBC	1800	.866	1.654	$ 4.99
KR2800CE	C	2800	.992	1.929	$ 7.99
KR5000DEL	D	5000	1.272	2.299	$ 10.95

FAST CHARGE	SIZE	mAh	DIA	HT	PRICE
N800AR	A	800	.650	1.909	$ 4.49
N1000SCR	2/3SUBC	1000	.866	1.299	$ 4.99
N1100CR	2/3C	1100	.992	1.173	$ 4.99
N1300SCR	SUBC	1300	.866	1.654	$ 3.99
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LETTERS

(Continued from page 9)

paint chipped off. Can you tell me what kind of paint will stick to the truck body? Is there a special way to prepare the plastic body before painting it? EDDIE BOWEN
South Bend, IN

Are you sure that you and your father used the proper paint?—one that's designed to stick to Lexan. The paint might be the culprit. Maybe you sprayed it on too thick. You have to apply it in thin, even coats. Or perhaps the inside of the body had dirt or grease on it; that would prevent the paint from sticking to it properly. You did paint the body on the inside, didn't you? If not, then that's the cause of your problem. JH

SOUTH OF THE BORDER

I've been reading your magazine for a year, and I think that it's outstanding. Believe it or not, we do have some R/C racing here in Chile. I own a Tamiya Boomerang and a King Cab, and I plan to buy the nitro-powered Kyosho Outlaw Rampage; that's why I have some questions for you all.

Does anyone make a '93 Ford Ranger Lexan body?

The SEES aluminum wheels for the King Cab look great, but it seems as though no major hobby shop carries them. Where

(Continued on page 94)

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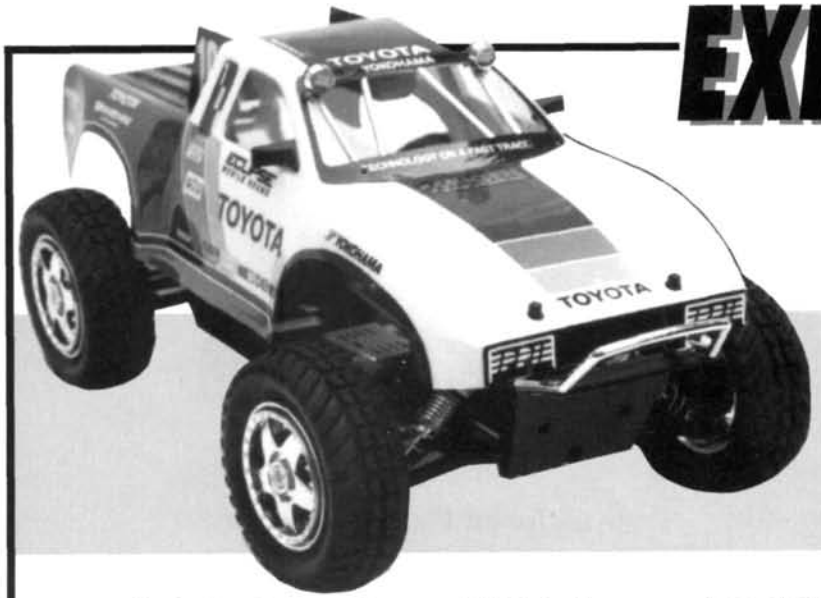

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Getting bored running the same old little truck around the track? Does your thrill factor kick in long past the end of a four minute main? Get a grip on some real thrills with **Mugen's Toyota Pick Up Truck.**

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RACER NEWS

Speed Shop

KYOSHO

1/8-Scale Motorcycles

These new Kyosho motorcycle kits provide the ultimate in realism: driver figures that actually move from side to side as the bikes go around curves! As authentic as the electric-powered Honda NSR 500 and Suzuki RGV "Hanging On Racers" look, their real beauty lies in how they perform on the track. The fully functional suspension has forks up front and a monoshock swing-arm rear suspension that absorbs bumps for a smooth ride. The powerful DM20 motor drives the rear wheel by means of a real roller chain, and three gear sets allow you to adjust power to suit track conditions. The sturdy reinforced frame will withstand abuse and keep on winning!

Part nos.—KYOC0342 (Suzuki), KYOC0341 (Honda); **price**—$139.95.

Kyosho/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826; (217) 398-3630.

TECNACRAFT

Titanium Kingpin/Axle Combo

Tecnacraft has combined two of their most popular items to give you a super front-end kit. Replace your stock steel kingpins with lightweight titanium pins, and replace your stock steel axles with titanium axles that use a threaded nut instead of the standard E-clips. This set weighs less than half as much as the stock parts!

Part no.—PN90603; **price**—$12.

Tecnacraft, 1335B Dayton St., Salinas, CA 93901; (408) 422-7466.

ASTRO FLIGHT

"Pro-Stock" Drag Motor

Team Astro's newest R/C car motor was specially built for the IEDA Pro-Stock (8-cell) drag-racing competition. It features Astro's unique "seven-pole" armature and heavy-duty commutator, as well as new, precision-trued "TachStack" armature stacks for better balance and higher rpm. It's wound with five turns of 18-gauge wire; these windings are spot-welded to each commutator segment, staked with slot wedges and tied with Kevlar before being epoxied into place. The Pro-Stock drag motor will work best with eight to 10 cells, and this makes it an excellent choice for many drag-racing classes, including 10-cell alcohol dragsters, funny cars, and for bracket and fixed-index racing.

Price—$119.50.

Astro Flight Inc., 13311 Beach Ave., Marina Del Rey, CA 90292; (310) 821-6242.

DYNAMITE

Turbo Flow Air Filter

The Turbo Flow air filter starts with a high-density, lightweight, foam filtering element that prevents even the smallest particles of damaging debris from entering your engine. The foam element is securely bonded to a flexible, dual-lip rubber base that fits all standard, .21-size car engine carburetors. It's ultra-light (4.5 ounces), so it stays put—even in jarring crashes!

Price—$5.95.

Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-0022.

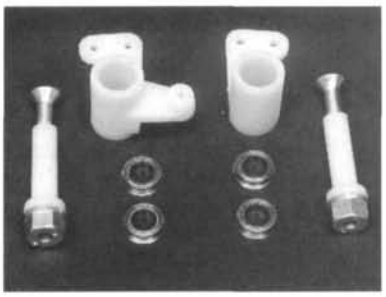
RCM

Serpent Mega SX-15 Engine

This high-performance racing engine is manufactured by Nova Rossi to Serpent's high standards. Its features include a large purple-anodized cooling head, a three-needle, 6mm slide-valve carburetor, and a longer stroke design that improves low-end performance.

Part no.—2600; **price**—$259.95.

RC Motor Sports of Miami, 4715 N.W. 157th St., Ste. 107, Miami, FL 33014; (305) 620-0005.



RPM

RC10 Ball-Bearing Bellcranks

This is the precision, ball-raced, bellcrank steering that's included in RPM's molded "Worlds" chassis kits. The geometry is the same as that of the stock Associated buggy bellcrank. It can be securely mounted in the threaded holes in your aluminum chassis. With the aid of a thin locknut on the top, it can also be used in a graphite chassis. It comes with four 1/4x3/8-inch flanged bearings, aluminum mounting screws and nylon top nuts.

Part no.—8002; **price**—$24.95.

RPM, 14978 Sierra Bonita Ln., Chino, CA 91710; (714) 393-0366.

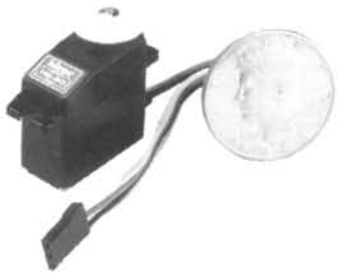
HITEC

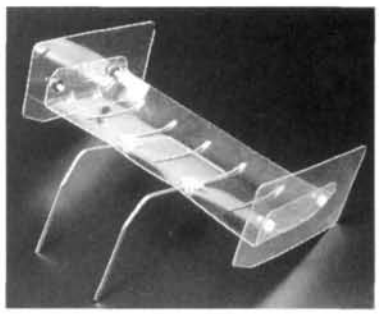
Sub-Micro Servos

The size of these sub-micro servos can be deceiving: they deliver a whopping 30oz.-in. of torque at .15 second—30 percent faster than any other microservo. They're also available with metal gears. Dimensions—1.1x0.53x1.1 inches; weight—0.8 ounce.

Part no.—HS-80, HS-80MG (metal gear); **prices**—$44.95, $59.95.

Hitec/RCD, 10729 Wheatlands Ave., Ste. C, Santee, CA 92071; (619) 258-4940.





BOLINK

Six-Inch Ribbed Wing with Side Dams

Bolink's improved 6-inch ribbed wing now comes with add-on side dams (in the maximum legal size), and it's made with thicker plastic for more rigidity and greater downforce. The ribs not only make the wing stronger and less likely to bend at high speeds, but they also tunnel air through for a more stable, faster ride!

Part no.—BL-2743; **price**—$7.95.

Bolink R/C Cars Inc., 420 Hosea Rd., Lawrenceville, GA 30245; (404) 963-0252.

TEAM ASSOCIATED

RC10LSO Racing Car Kit

With the introduction of the RC10LSO, Associated has improved the superspeedway oval car. The RC10LSO includes Associated's new Dynamic Strut Front Suspension, which gives you the ability to change caster, camber and spring rates quickly and easily. Also included is Associated's new and improved shock with a Teflon shock piston and Teflon assembly parts. The RC10LSO is easy to assemble, thanks to the easy-to-follow instruction manual that's packed with more than 100 photos and drawings. The kit is a complete rolling chassis with bearings; it does not include a body, motor, batteries, or electrics.

Part no.—8012; **price**—$250.

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9337.

Descriptions of the products shown on these pages were derived from press releases supplied by manufacturers and/or their advertising agencies. The information given is neither an endorsement of the product by *Radio Control Car Action,* nor a guarantee of performance or safety. If you write to the manufacturer about any product described here, be sure to say that you read about it in *Radio Control Car Action.*

LETTERS

(Continued from page 91)

can I buy them?

Does JPS, or anyone else, manufacture aluminum wheels for the Outlaw Rampage?

What type of charger or adapter do I need to charge 6V receiver Ni-Cd packs, such as the DuraTrax 6V 600mAh receiver pack?

All the help that you can give me is highly appreciated. Keep up the excellent work.

MAURICIO GIANGRANDI
Santiago, Chile

Both Protoform and Andy's R/C Products make '93 Ford Ranger bodies. The '93 Ranger body from Protoform fits the Team Losi LX-T and the Traxxas Blue Eagle LS, and they're currently working on a '94 Ranger that fits the Team Associated RC10T. The Andy's '93 Ford Ranger body fits the LX-T. I haven't found anyone who makes the Ranger body for the Outlaw Rampage, although the Protoform or the Andy's body might fit with some modification.

I have some bad news and some good news about your wheel dilemma. First, the bad news: SEES is no longer in business. You'll have to look around for other hobby shops to see if they have any of their wheels left over in stock. Now, the good news: JPS not only makes aluminum wheels for the Outlaw Rampage, but it makes them for the Tamiya King Cab as well. The JPS wheels retail for $39 a pair; you can contact JPS at (916) 238-8122.

To charge your receiver packs, you need a linear charger with adjustable current that goes down to .5 amp. It should take roughly 10 minutes to peak-charge the pack. JH ■

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TEAM LOSI TECH TALK

Sway Bar Kit

Team Losi now offers a sway bar kit designed specifically for the Double-X car. The mounting position tucks it away to help protect it from being hit or catching when rolling over. A sway bar generally increases the steering out of a corner. It can, however, take away a little steering going into a corner. These sway bars have been used with great success on tracks with high-speed corners and lots of traction. They were used by all the team drivers at the '93 IFMAR World Team Championships in England. The sway bar kit comes with four different diameters of bars and all required mounting hardware. They're available now! (Part no. A-4140).

Need more steering with your truck?

Team Losi has just released their new Low Profile truck tires. These tires have been through many design changes during their development until the team felt that they were finally the way they wanted them. These tires are smaller in diameter than the standard front tires, and they feature an offset rib design.

The tires can be mounted in two different directions, placing the wide rib offset to the inside or the outside. This makes the tires have different steering characteristics; they're truly adjustable front tires. The Low Profile tires are available in both HT (part no. A-7504) and Gold (part no. A-7504G) compounds. Of course, the Gold compund tires come with free foam inserts.

Simple Slipper

Assembling the slipper can be difficult. Sometimes, you wish that you had a third hand. This is especially true when it comes to the slipper pad portion of the assembly. This process can be made a little easier. By gluing the slipper pad to the gear plate, the assembly becomes much easier. This also helps to keep the slipper pad from distorting and squirming around.

When doing this, be sure to use a very small amount of a *thin* cyanoacrolate glue (super glue). Care must be taken to ensure that the slipper pad is glued flat on the gear plate. If the pad is crooked, it will take longer to "seat" properly. When you're ready to change the pad, simply scrape the old glue off the gear plate with a sharp hobby knife.

* * *

Let us know what's going on! Address your questions and problems to Team Losi, "Tech Talk," 13848 Magnolia Ave., Dept. J, Chino, CA 91710.

RACER NEWS

Team Losi's Jack Johnson motors his Baja King around the newly designed Ranch Pit Shop off-road track.

WHEN THE PEOPLE at Model Rectifier Corp.* (MRC) parted amicably from Tamiya, they wanted to get back into R/C cars in a big way, and they did. They introduced their daring new line of World Scale off-road vehicles, and the industry shifted on its axis.

The World Scale vehicles—the Desert Thunder Buggy, Baja King Stadium Truck and Thunder King Monster Truck—are fast, easy to drive and durable: a perfect combination for first-time racers. What's more, experienced racers, too, will be pleased with the race-proven features of these R/C giants and will welcome the challenge of customizing these World Scale wonders. Who knows, maybe one day, ROAR, NORRCA, or PROCAR will add a World Scale class to its existing race line-up. Meanwhile, it's up to the race-track and hobby-shop owners to promote this great new line of cars and trucks and to offer racing classes for them as well.

MRC/TRINITY WORLD SCALE

DASH for CASH

When these MRC vehicles gather steam, doubles are no problem!

Big trucks, big bucks

by GEORGE GONZALEZ

BIG RACE—BIG BUCKS

Sponsored by MRC and Trinity and hosted by the world-famous Ranch Pit Stop, the Dash For Cash (September 17 to 19, '93) was the first organized race for these vehicles. Substantial cash prizes were up for grabs: how does $2,000 for first place grab you?

• **Day 1.** *Friday—Practice*
Friday was check-in day, and the track was open for practice. MRC provided every driver with a World Scale T-shirt and a very comprehensive and professional 16-page rule book: I didn't have the time to read the entire rule book, but I have to admit, I have never seen anything quite like it before. It was a blast to watch the World Scale cars and trucks tear up the track; the large size of the track made the vehicles look true to scale.

• **Day 2.** *Saturday—Desert Thunder Buggy*
Most of the entrants seemed to prefer the Unlimited Class, so the Sport Class was taken off the agenda. Three rounds of qualifying were scheduled, and the race would be won in a single A-Main.

I walked around the pits and checked out all the hopped-up Desert Thunders. I had never seen so many drilled-out, milled-out and cut-out chassis plates! Battery configurations ranged from six to eight cells, and some drivers used only one motor instead of the usual two. At one time, Daryl Lane of A&L Mfg.* had *three* motors bolted onto his modified Desert Thunder; the third motor wasn't actually providing additional power, however; he used it to add more weight to his rear end in an effort to gain extra traction.

To save weight, many drivers went with a single high-torque servo instead of using two, and to increase steering response, some used two high-speed servos; this not only increased speed, but also torque.

Others increased rear toe-in by slipping coins between the tranny case and the back of the A-arm mounts. A dime provided approximately 1 degree of toe-in; a penny, 2 degrees; and a nickel, 3 degrees. This was racing ingenuity at its best. Later, I overheard someone say he needed a couple of cents' worth of toe-in.

With fresh battery packs—and a fresh track—it was time to bring home the bacon. The buzzer sounded and they were off—into a giant turn-1 pile-up. Rick Hohwart and Jack Johnson managed to avoid it, and from then on, it was mainly a battle between the two of them. But Hohwart's Desert Thunder seemed to be faster, and his lead increased by a few car lengths on every lap. He soon

Here are a few of the happy contestants in the MRC/Trinity Dash for Cash.

UNLIMITED BUGGY CLASS

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	1	Rick Hohwart	Desert Thunder	Peak Performance	Orion	Novak	Futaba	MRC	MRC
2	2	Jack Johnson	Desert Thunder	Peak Performance	Orion	Novak	JR Propo	MRC	MRC
3	3	Jay Halsey	Desert Thunder	Revolution	Sanyo	Novak	Airtronics	MRC	MRC
4	6	Chris Allec	Desert Thunder	Peak Performance	Sanyo	Novak	JR Propo	MRC	MRC
5	4	Jon Anderson	Desert Thunder	Trinity	Trinity	Novak	KO Propo	MRC	MRC
6	5	Derek Furutani	Desert Thunder	LRP	Orion	LRP	KO Propo	MRC	MRC
7	7	Tony Neisinger	Desert Thunder	Point Blank	Point Blank	Tekin	Airtronics	MRC	MRC
8	8	Richard Sorenson	Desert Thunder	Peak Performance	MRC/Sanyo	Novak	Airtronics	MRC	MRC

UNLIMITED TRUCK CLASS

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	1	Jay Halsey	Baja King	Revolution	Sanyo	Novak	Airtronics	A&L	MRC
2	2	Jack Johnson	Baja King	Peak Performance	Orion	Novak	JR-Propo	A&L	MRC
3	3	Rick Hohwart	Baja King	Peak Performance	Orion	Novak	Futaba	A&L	MRC
4	5	Chris Allec	Baja King	Peak Performance	SCRC	Novak	JR-Propo	A&L	MRC
5	4	Jon Anderson	Baja King	Trinity	Trinity	Novak	KO-Propo	A&L	MRC
6	6	Tony Neisinger	Baja King	Point Blank	Point Blank	Tekin	Airtronics	MRC	MRC
7	7	Jimmy Wright	Baja King	Fantom Racing	World Class	Tekin	Airtronics	A&L	MRC
8	8	Richard Sorenson	Baja King	Peak Performance	MRC/Sanyo	Novak	Airtronics	A&L	MRC

SPORTSMAN STOCK CLASS

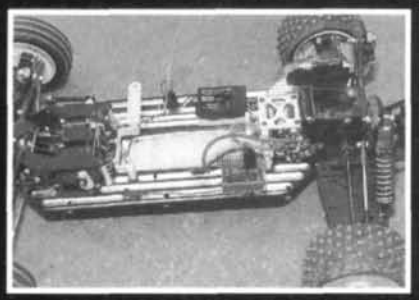
Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	1	Mike Lee	Thunder King	Handout	Reedy	Novak	KO-Propo	MRC	MRC
2	2	Craig A. Erion	Thunder King	Handout	Trinity	Novak	Futaba	MRC	MRC
3	3	Tom Cat	Thunder King	Handout	Trinity	Tekin	JR-Propo	MRC	MRC

In the Unlimited Buggy class, Rick Hohwart took the overall win and netted $1,000 for his hard work.

PHOTOS BY A.R. FLATBUSH

Jay Halsey's win in the Unlimited Truck class earned him the grand prize—a whopping $2,000.

Hop-Ups



A&L now offers an extensive line of hop-ups that will enhance the performance of the World Scale Vehicles. You can buy the parts individually or in complete kits.

- **FRONT AND REAR SHOCK TOWERS**—part nos. 2015 (front), 2014 (rear). Make your World Scale vehicles more tunable with these ⅛-inch-thick, fiberglass towers. They have a multitude of shock and camber-rod mounting holes for precise tuning and better shock angles.

- **STEERING ENHANCEMENT KIT**—part no. 7201. This will improve steering response because it has a fiberglass servo-saver stiffener and tighter ball ends. The kit includes a titanium center link that's stronger and lighter than the stock unit. If you want slop-free operation, less weight and more strength, try this.

SPUR GEAR ADAPTER KIT—part no. 7200. This includes a light, machined-Delron spur adapter (to replace the heavy stock slipper) and slotted-aluminum motor spacers to help with gear alignment. Best of all, this kit allows the use of the popular Robinson Racing 48-pitch gears.

- **UPPER CONTROL ARM KIT**—part no. 7202. This is perfect for a World Scale vehicle on a diet. It includes a set of light, durable, "monster" titanium turnbuckles and a set of tighter-fitting, ball ends for better lateral movement without bending.

- **LEXAN GEAR COVER**—part no. 9033. It's much lighter than the stock hard plastic unit, and it's clear, so you can paint it to match the body trim, or leave it clear so that you'll be able to see the gears easily.

- **DESERT RUNNER**—a racing-truck body for the Baja King. Mount it on the Baja King, and you'll immediately shave off 5 ounces of dead weight. This body is lighter and narrower; its aerodynamic design increases top speed; and it comes with molded number plates and a molded spoiler—and far-out looks.

DASH FOR CASH

had a 5-second lead on Johnson, so it was just a matter of staying cool and driving consistently for the rest of the race. I'd probably have choked, but Hohwart is a professional, so he managed to hold on to the lead and take home the paycheck with a 10/4:01.06.

Jack Johnson ran an exceptionally good race: his 10/4:05.09 time earned him second place and $500. Jay Halsey finished in third—a cool 200 bucks.

• **Day 3.** *Sunday—Baja King and Thunder King day*

Two classes were scheduled: Sport Truck and Unlimited Truck. The only modifications allowed to Sport trucks were: bushings could be replaced with bearings; and the Thunder King's heavy front and rear bumpers could be removed or cut down. Electronic speed controllers were allowed.

In Unlimited Truck, it was pretty much anything goes, but some of the hop-up parts had to be commercially available to all the drivers to keep things fair.

Hordes of spectators showed up; they were eager to see the impressive World Scale Baja Kings tear up the Ranch Pit Shop. All the drivers who had competed in Unlimited Buggy were back again to race in Unlimited Truck; in fact, they used their Desert Thunder Buggy chassis with Baja King bodies, wheels and tires. As on the previous day, three rounds of qualifying would be followed by a single, decisive, A-Main.

SPORT TRUCK A-MAIN

To everyone's surprise, the Sport Truck A-Main was one of the most exciting races at the event. Talk about close! These bone-stock trucks rode one another's bumpers and rubbed fenders the whole way.

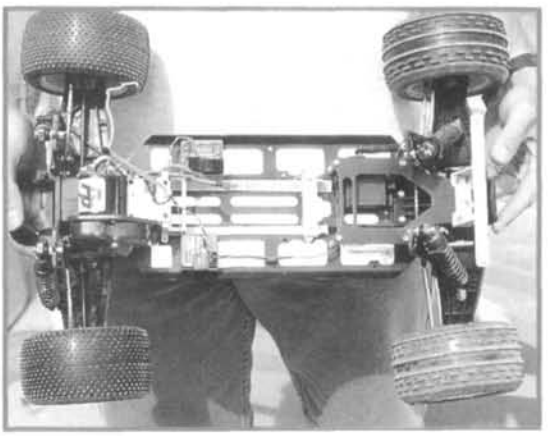
Craig Erion got the holeshot and kept the pace for most of the race. His Baja King was the fastest, and he really had an edge on the long straightaway. But Mike Lee's Thunder King was faster on the corners, so we had the classic speed-versus-handling scene. Lee repeatedly caught Erion on the corners but was left behind on the straightaway. We wondered how long this would continue. Would Erion's batteries hold up for another 30 seconds?

It came down to the wire, and there was no sign of Erion's truck slowing down. Lee kept up the pressure, however, and with less than 20 seconds to go, he took the lead. But Erion wasn't about to give up: with less than 15 seconds to go, he went back out in front. It seemed as if Lee's chances were zero, but Erion took the last corner too wide, and Lee squeaked in for the win—and a $400 check—with a 9/4:15.36. With a 9/4:17.05, Erion came in second and took home $200. And in third, Tom Cat took home $100 for his 8/4:02.67.

UNLIMITED TRUCK A-MAIN

This was a very tight race; it's amazing how much motivation a $2,000 check can inspire! The track became a war zone as the souped-up Baja Kings set off in a shower of dirt.

Once again, Jay Halsey, Jack Johnson and Rick Hohwart dominated, while Chris Allec and Jon Anderson were within striking distance. The top three often swapped places, and at the 3-minute mark, the $2,000 first-place prize was still up for grabs.



Most of the racers have many hours' worth of work invested in their buggies and trucks. Trick mods include milling the chassis, suspension arms and wheels, and adding hot modified motors, batteries, ESCs and a ton of lightweight after-market products.

Then the end-of-race buzzer sounded, and they all made a mad dash for the finish line. The result? In order: Jay Halsey—10/4:02.79—$2,000 grand prize; Jack Johnson (less than 1 second behind)—$700; Rick Hohwart (less than 1 second behind Johnson)—$300.

The MRC/Trinity Dash For Cash was one of the most intense races I've ever seen. I've never seen such tight racing in a non-sanctioned event. Who knows? Maybe this is just the start of a new racing class. Perhaps, one day, there will be sanctioned World Scale races all over the USA. I know one thing for sure: when the next World Scale race comes around, I'll be there—driving!

**Here are the addresses of the companies mentioned in this article:*
Model Rectifier Corp. (MRC), *200 Carter Dr., Edison, NJ 08817; (908) 248-0400.*
A&L Mfg., *P.O. Box 2115, Corona, CA 91718; (714) 735-5249.* ■

SCOPING OUT

NOVAK 610-HRV

by JOHN RIST

NOVAK* IS A MAJOR manufacturer of electronic speed controllers (ESCs), so I started testing their 610-HRV high-frequency, reversing ESC with high expectations. Were my expectations fulfilled? Read on....

INSIDE STORY

If you absolutely *have* to look inside, you only have to remove four screws. Lift off the bottom half of the case, then slip the top half up and over the heat-dissipating tabs. (Be careful to avoid damaging the top printed-circuit board that sits on the main controller board.)

The two circuit boards are connected by a row of seven riser wires that are plugged into pin sockets—a technique that I first saw in a plated-wire memory on the Voyager satellite program. This technique is highly reliable, and it allows many components to be packed into a small area.

The high-current components, e.g., the power-handling FETs and the BEC voltage regulator, are on the main board. Heavy etch, bent FET leads and heavy solder all work together to provide a low "on" resistance path for the motor current.

The smaller, upper board carries the control circuitry, of which the main component is a computer chip that's custom-made exclusively for Novak. This board also contains the pulse-checking LED and the three pots needed to match the 610-HRV to your transmitter.

The case halves are joined by a tongue-and-groove seal; there's a rubber gasket around the FETs; and rubber plugs are provided for the adjustment holes. This means that *you* get a relatively dirt-free case—not waterproof, but it should keep out the slop we hammer-handed drivers sometimes run through.

CHECKING THE EVIDENCE

With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its "on" resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's "on" resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

- Along the full length of the wires (including connectors), the voltage drop was 0.25 volt—an "on" resistance of 0.021 ohm.
- Two inches along the wires, the voltage drop was 0.15 volt— a resistance of 0.012 ohm.

These figures are probably a little higher than you'd want in a racing-style ESC, but for a reversing ESC, they're quite low. In reversing controllers, the FETs are divided between forward and reverse, and they always have a higher "on" resistance than racing-style, forward-only-with-brake ESCs.

TAKING THE HEAT!

I "cook" every ESC I test by adjusting the resistor bank to pass 20 amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps.

After this treatment, the 610-HRV was much too warm to touch comfortably, but it wasn't even close to being hot enough to cause thermal shutdown. It took the abuse without a hitch.

IT'S FRYING TIME AGAIN!

In my dead-short test, I check to see whether the ESC could survive the heavy current it would have to withstand if a gear jammed or the motor fried. With the motor leads shorted together, I adjusted the controller until it was fully on forward.

The current jumped to a hefty 40 amps (the limit of my bench power supply), and after approximately 30 seconds, the smell of burning plastic was unmistakable. Time to pull out the power plug! The heat sinks were much too hot to touch without getting skin-scorch!

I removed the short, and after a brief cool-down period, I turned the speed controller on again. It worked as it should. Near a couple of the power-handling FETs, the case was slightly damaged, but the 610-HRV is *tough!*

BACKYARD BURN-UP

Reversing controllers are meant for fun, so I read the instruction book (a must-do!) and then set up the 610-HRV in my Kyosho Sideways. Installation is easy, because it comes with a complete set of installed connectors.

The instructions cover several

The 610-HRV is definitely a "Cadillac" among reversing controllers. It's one of the few truly high-frequency reversing ESCs on the market.

Novak controllers, but a few inserted pages are specific to the 610-HRV. I generally frown on "universal" instruction books because they sometimes confuse newcomers, but this one is well-written and very helpful. In the section on Schottky diodes, there's a prominent warning against using an external Schottky diode in an ESC with reverse. There's good reason for this; if you put a reversing controller in a car that has a Schottky diode installed across the motor, there will be a *large* explosion. (Unfortunately, I speak from experience.) Just read the pertinent pages, and you'll be fine.

Driving on grass is brutal treatment, both for a car and its components. The grass drags on the front bumper and belly pan, so the motor has to strain. Running on grass has probably ruined more motors than most of us care to admit, but I'm here to see whether these things can stand the abuse of the ignorant, so....

After every run, the battery, controller and motor were all quite hot, but run times, speed and acceleration were all very good. And when the car went into a tree, reverse got it out of trouble.

On one run, I played with the reverse-delay adjustment. It gives up to a leisurely 3-second delay before the car flies backward, but for me, mid-range was the best setting—fast enough to avoid having an irritating wait and slow enough to protect the tranny from being damaged by an accidental venture into reverse.

NOVAK 610-HRV

DIMENSIONS	
Height with heat sink	1.19 in.
Width	1.68 in.
Length	1.76 in.
Weight w/wires and heat sink	2.5 oz
TUNING	
Access to controls	Excellent
Ease of adjustment	Good
LIST PRICE	$165
Warranty	90 days
ELECTRICAL	
Manufacturer's specs	
Max. voltage	(10 cells) 12 volts
Min. voltage	(6 cells) 7.2 volts
Max. current forward	120 amps
Max. current reverse	60 amps
Resistance	0.0065 ohm
TEST PARAMETERS	
Voltage	6 volts
Current	12 amps
Voltage drop along length of wires	0.25 volt
Voltage drop 2 inches along wires	0.15 volt
Calculated Resistance*	
Resistance along length of wires	0.021 ohm
Resistance 2 inches along wires	0.012 ohm
BEC Voltage, 6 cell pack	4.98 volts

*Resistance = Voltage drop/current

COMMENTS: if you're looking for a hot reversing speed controller, try the Novak 610. It has the one of lowest "on" resistances ever recorded in the "Scoping Out" lab for an ESC with reverse. It's ideal for racing where reverse is allowed or required. It's also loaded with features such as adjustable reverse delay and high-frequency motor control.

SO WHAT DO YOU GET?

The 610-HRV is definitely a "Cadillac" among reversing controllers. It's one of the few truly high-frequency reversing ESCs on the market. Based on this alone, I can recommend this controller without reservation. During the driving test, this feature was always evident, especially when running at slow to moderate speeds. A high-frequency setup is always silky smooth.

You might eventually want to hop up your buggy by replacing the stock connectors with premium, racing-style connectors such as Deans* Ultra Plugs. But remember that rewiring will void the warranty, and mistakes will destroy the speed controller.

And I don't advise you to pass enough current through this controller to activate its thermal cutoff. Regardless of how many cells it has, a Ni-Cd battery pack can deliver 100 amps. At this level, you'll see smoke coming off every component on your car, so if you have any trouble, such as the car running more slowly than it should be, stop and fix the problem before you destroy your expensive equipment.

The 610-HRV is well-made and, given reasonable care, it should provide years of reliable service. So if you're looking for a new reversing speed controller, look the 610-HRV over. I think you'll like what you see.

WHAT IT HAS

- Fully proportional forward and reverse.
- Four FETs for forward; two for reverse.
- True, high-frequency motor control.
- Three adjustment pots: neutral, full speed and reverse delay.
- Full set of installed connectors: Tamiya-style battery connector; bullet-style motor connector.
- Universal receiver-connector kit, which allows it to be used with most popular radios (comes set up for the Futaba J).
- Automatic thermal shut-down.

Of course, Novak includes an instruction book, heat sinks, motor capacitors, mounting tape, adjustment-hole plugs, an adjustment screw driver and a hot set of decals.

Here are the addresses of the companies mentioned in this article:
Novak Electronics Inc., *18910 Teller Ave., Irvine, CA 92715; (714) 549-0875.*
Deans Connectors; *distributed by Ace R/C, 116 W. 19th St., Box 511C, Higginsville, MO 64037.* ■

NITRO NEWS

GAS BUILDUP

by JEFF BRONSTEIN

Before you start, clear a space where you can leave everything undisturbed for the next few days...er, weeks...uh, however long it takes. Have everything you need to complete the kit (including a fresh bag of Rold Gold) on hand.

AT LAST, YOU have the nitro car or truck of your dreams. If you're like me, you want to get it out of the box and onto the racetrack as soon as possible. Unfortunately, many racers—novice and expert—build their new cars and trucks in a mad flurry, then they wonder why their cars don't perform well. Instruction manuals are complete when it comes to assembly, but they usually lack the particulars of fine-tuning and optimizing each component's performance. In addition, mass-produced parts are cost effective, but to achieve a perfect fit, you must make slight alterations and adjustments. Building a kit carefully and correctly is the biggest performance edge you can get; and it's a *free* "hop-up"!

In addition to the basic tools, such as pliers, screwdrivers, cutters, etc., I also keep a Dremel tool, some polishing compound, a hobby knife, several small files and sandpaper handy.

Before building, don't take that "I don't need instructions" attitude. Take the manual out, and skim through the major building phases. Using a highlighter, mark any unusual or confusing sections. Then, read every word in each section. Don't open any of the packages because most kits parts are divided according to sections in the manual.

Prepare all your tools, and clear a large work area where you can leave everything undisturbed for a few hours, or weeks, or months, or however long it will take to finish your car or truck. In addition to the basic tools (screwdrivers, pliers, Allen wrenches, etc.), I always have a Dremel tool and/or a drill, a variety of small files, a hobby knife, a caliper, Loctite and some type of fine polishing compound on hand. I also like to use plastic bowls to place parts so that they won't get lost or mixed up. Keep everything clean and organized.

PARTING PARTS

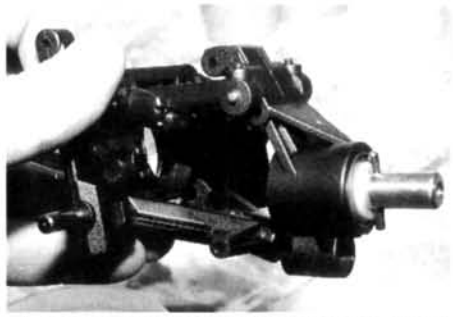
Following the instructions, open each bag and empty its contents into a bowl. Separate smaller screws, setscrews, circlips, etc., into a smaller container or a lid. Always check the parts list to ensure that everything is there. Before starting each section, check all molded parts for flashing left after the injection-molding process. Examine metal parts for machining flaws and sharp edges. Use a hobby knife or a file to carefully remove any unwanted material. Roll the jackshafts, the output shafts and the pivot pins on a smooth, flat surface to check that they're straight and true. Finally, test-fit each assembly before you screw or pin the parts together. When you join each section to the chassis, leave the screws a little loose to avoid tweaking the chassis pan.

PHOTOS BY JEFF BRONSTEIN

Cut the flashing off plastic and nylon parts. This is usually found at the points where mold halves meet.

BEARING DOWN

Assembly usually starts with the drive train or the transmission. Oil and then carefully press-fit each bearing into place. If a bearing is difficult to insert, try beveling the edge of the bearing seat to allow the bearing to slip into position. Never remove material from inside the bearing seat itself, or the alignment may be thrown off. Lubricate differential gears or balls



Once assembled, each suspension component should move up and down freely. If the suspension sticks or binds, it can't work properly. Take the time to do it right, and you'll get good results on the track.

RECOMMENDED TOOLS

- Small pliers
- Needle-nose pliers
- Surgical forceps
- Screwdrivers (several flat-blade and Phillips-head)
- Nut drivers
- Allen wrenches
- Small cutters
- X-Acto knife and no. 11 blades
- Simichrome polish
- Small vise
- Wet/dry sandpaper
- Small files
- Dremel tool and/or drill
- Caliper and straightedge
- Rags
- Rold Gold (optional)

Use small plastic bowls with lids to hold any small parts that might get lost. If you have to stop before the kit is completed, the bowls can be sealed. By keeping everything organized, you'll avoid having to look for the right part.

with the "good stuff" (not necessarily what comes with the kit), but not too much. A light coat will probably produce the best differential action.

After assembly, ensure that nothing binds. If, however, a gear or belt is slightly misaligned, a small shim may be required to achieve a proper mesh. The gears may still feel slightly tight, but they'll free up as they run in. A smooth gearbox will make the engine operate much more efficiently.

Most "new car" performance problems are caused by botched suspension jobs. If the suspension doesn't work, nothing else will. Make an effort to ensure that everything fits properly and moves smoothly. Polish each pivot pin or ball to a mirror-like finish. Using a Dremel tool or a drill, spin a pivot ball in each nylon cup until the ball moves freely. A little Simichrome will help in the process. Test-fit each pin and suspension arm. Each arm should be able to move freely to both extremes.

Before you install the shocks, the springs, the radio, etc., assemble the entire chassis, and check the suspension movement at each corner. Suspension arms should move up and down with little or no resistance. Stabilizer bars should rotate freely. Dogbones and drive axles shouldn't bind in any position. The steering linkage shouldn't rub against the chassis or the suspension, and there should be little or no bump.

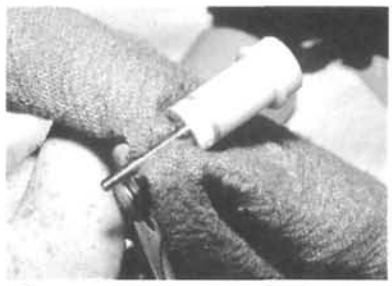
With bare wheels installed on the suspension, look for rubbing on the uprights and slop on the wheel carrier. Check for symmetry in the toe-in/out, the caster, the camber, etc. The front and rear wheels should have the same range of motion. It may take several attempts to assemble everything correctly, but the results at the track will be worth it.

Before you assemble the shocks, inspect the inside of the shock body and inspect the piston. Both should be symmetrical and smooth. When cutting the piston out of the molded template, carefully remove any flashing. Try not to cut into the damper itself.

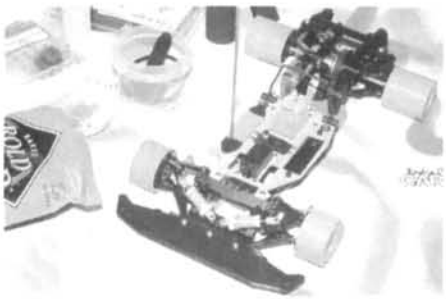
With the damper and piston rod assembled, test-fit the shock before adding oil. Feel for any inconsistencies as the piston damper moves up and down. Thread the pivot end onto the piston rod, and match the lengths of both sets of front and rear shocks. When you fill the shocks, move each one up and down several times to ensure that no air bubbles are caught under the piston. When the shocks have been assembled, feel them again for symmetry and smoothness.

Don't over-tighten the fuel-tank mount or the receiver vibration mount. Tank vibration makes the fuel foam, and this can lead to carburization problems. It can also damage the delicate radio receiver unit. Shield this unit from fuel and debris by putting it in shrink-wrap material or a small balloon. Mount the servos, the battery and the fuel tubing securely on the chassis or the radio tray. Try to route the servo and switch wires away from the ground and any moving parts. Use tie-wraps to bundle them, or shorten the leads to the proper length.

This is a definite no-no! Never grab the shock piston rod with anything that might scratch it. Even a tiny scrape will allow the shock oil to leak out and impair the shock's performance.



If you must grasp the shock rod to thread the pivot on, wrap a rag around the rod. Then, using minimal pressure, grab the rod with small pliers, and don't allow it to twist.



And there you have it: the "Readers' Digest" version of building a gas car. The Rold Gold are gone, and this machine will be going to the races before long.

CHASSIS CHECK

When the entire chassis has been assembled, tighten everything uniformly. Look for twisting and bowing in the chassis that may indicate misalignment. Finally, re-check the symmetry of both sides of the suspension. If you've taken the time to do everything right, your car will perform predictably well the very first time you run it. Now, all you have to worry about is driving it. ■

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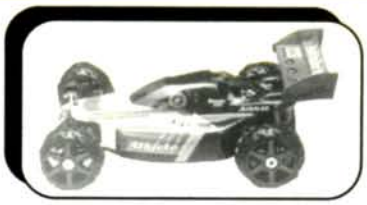

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OFNA TEMPO

(Continued from page 65)

into the tabletop jump at around 60mph. I chalked up some serious frequent-flier points on this one, and the Tempo made a perfect four-point landing 20 feet away.

Next came a 45-degree left turn that led to the side stretch. I had a chance to really open it up here and, let me tell you, this buggy can get up to some serious speeds. Because this section of the track was so far away and dust impaired my vision, I lost sight of the car for a second and, before I knew it, I had overshot the sweeper at the end of the side stretch and wiped out severely. I was afraid to look, but I found the car resting on all four tires and still running. (How sweet it is.)

By this time, Wally and A.R. had their cars on the track, and I had some serious competition on my hands. We raced our cars for hours and, at one point, there was so much dust in the air, that it was hard to breath. Unfortunately, it was getting dark, so we had to retire; if the track had lights, we would probably still be racing. When I got home, I checked the car thoroughly for damage, but I found only a slightly bent hinge pin.

Eighth-scale, 4WD gas cars are 100 percent adrenaline; I can't remember having this much fun with an R/C car. If you're looking for an inexpensive way to get into 1/8-scale gas racing, but you don't want to sacrifice performance or reliability, there's an OFNA Tempo with your name on it.

**Here are the addresses of the companies mentioned in this article:*

OFNA Racing Division, *18 Technology, Ste. 159, Irvine, CA 92718; (714) 753-6056.*

Associated Electrics Inc., *3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9337.*

Air Works, *57 Valley St., Adams, MA 01220; (413) 743-5919.*

Brat; *distributed by OFNA Racing Division.*

Airtronics Inc., *11 Autry, Irvine, CA 92718; (704) 830-8769.*

Novak Electronics Inc., *18910 Teller Ave., Irvine, CA 92715; (714) 549-0875.*

PTI (Progressive Technologies Inc.), *P.O. Box 950, Pilot Mountain, NC 27041; (800) 333-1375.*

O'Donnell Racing, *10702 Hathaway Dr., Santa Fe Springs, CA 90670; (213) 944-9671.* ■

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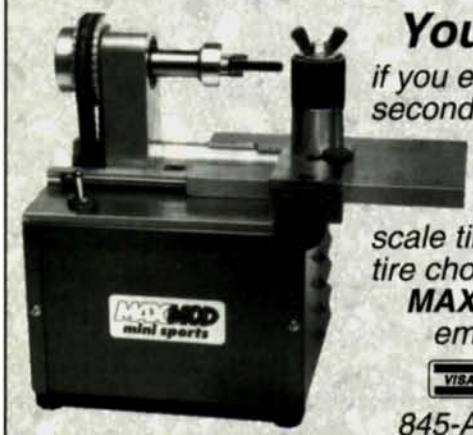

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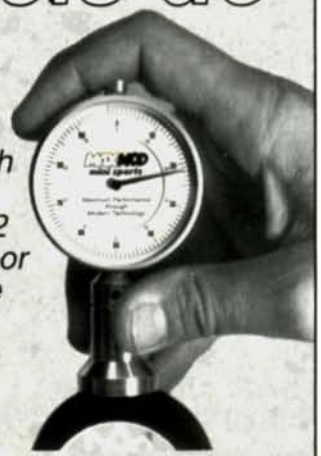

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CAR ACTION HOW TO

A Matter of Record

Make Your Own Racing Log

by GARTH FINLEY

HAVE YOU EVER forgotten the viscosity of the shock oil you used the last time you drove your car? Maybe you haven't—if you have a wonderful memory, or if you own only one bottle of shock oil. But for those of us who are constantly changing motors and chassis settings to attain the ultimate setup, it can be confusing, and we often forget what we've changed. More important, we might forget how the car actually performed on the track after these changes had been made. Well, folks, why don't you take out paper and pencil and simply record this information in a racer's log?

Preparation at home and efficiency at the track are two important factors that can help you to win races. A comprehensive record can help your setup efforts in both areas and assist you when practice between qualifying heats is a luxury. At a large, 1/10-scale off-road race, the track's surface can vary drastically between qualifying rounds. Can you think of a better aid than a personal diary to help you handle this situation? It can take some of the guesswork out of your decisions.

Now is the time to start keeping a record of your racing. The completed sample page shown illustrates just how thorough your records can be. Believe me, factory drivers go into this much detail to describe their setups to their teammates at large races.

***How* you keep your records is totally up to you. I've found the best way to keep an accurate log is to use a form that allows me to enter the most information in the least time. Let's face it: at the track, we're always in a hurry.**

Keeping records of setups used under a variety of track conditions can give you an advantage when the track's surface varies, and it can boost your confidence in your car before the green flag drops. I encourage you to develop a form that's suitable for your needs and for the type of car you race. An accurate log can give you a winning edge! ■

motor TECH SPECIAL

IF YOU OWN one of the popular brands of commutator cutting lathes, listen up; Team Cobra's* new Power Feed will make your cuts more accurate and your lathe much easier to use. How? When hooked up to a 12V power supply, the Power Feed provides precise control over the movement of a lathe's carriage feed and allows you to accurately regulate the speed at which the armature spins.

TEAM COBRA

Power Feed

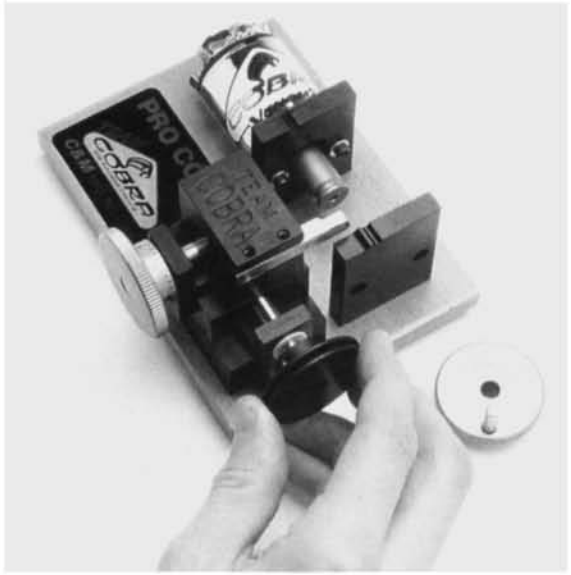
by FRANK MASI

Team Cobra's new Power Feed provides precise control of the carriage movement of your comm lathe.

With a lathe alone, you move the cross-feed to bring the cutting bit in toward the commutator until it *just* makes contact, then you manually turn a handwheel to move the carriage and drag the bit across the comm's surface. Lathe owners call this "making a pass." (Chianelli has his own definition, but that's for adults only!)

When the Power Feed takes over, a belt pulley replaces the handwheel so that a separate motor inside the Feed can make the pass for you. Obviously, because you can now accurately control the speed of the carriage, the cut is more precise.

The Power Feed also controls the speed of the motor that spins the armature that's mounted on the lathe. Because you can monitor the voltage of both motors—the one that moves the carriage as well as the one that spins the armature—you can find the optimum settings for both and always duplicate them for future cuts.



The first thing to do is to replace the carriage handwheel on your lathe with the supplied belt pulley. The Power Feed will move the carriage for you!

POWER BITS

The Power Feed comes with all the necessary hardware, i.e., the belt and pulley, to hook it up to most lathes. I used Cobra's Pro Com 2000 motor lathe, though most lathes that will fit atop the Power Feed's case and that have removable handwheels will work.

First, I replaced the lathe's handwheel with the pulley. The Pro Com fits on top of the Power Feed perfectly. Another smaller pulley protrudes from the side of the Feed; you connect this to the one that's now on the lathe with a small, rubber O-ring that acts as the drive belt.

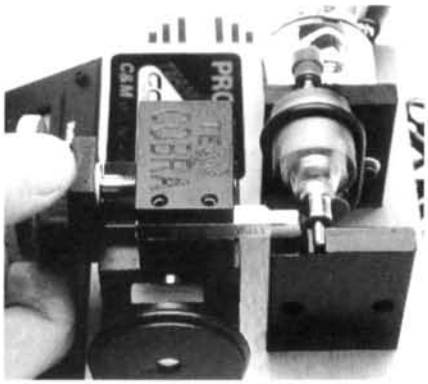
The Power Feed doesn't come with the motor that's supposed to move the carriage, so you'll have to use your own. Cobra states that it's very important to use the right kind of motor: it shouldn't draw more than 2.5 amps under no-load conditions, or it could damage the Power Feed's circuit board. Hence, outlaw stock motors and modifieds won't work; use an old beater stock motor or any stock 540 motor, and play it safe. I used one of Team Cobra's 24-degree, ROAR-legal Venom stockers.

I wanted to try out the Power Feed by cutting the comm of one of my most worn-out modifieds, so I removed the armature from the can and cleaned it with motor spray. After mounting the arm on the lathe (shimming it properly to prevent any side-to-side play), I attached the posi-

tive and negative leads from the Power Feed to the lathe motor. (Before you cut, make sure that the armature rotates in the correct direction as specified in your lathe's instructions!) I hooked the unit's input leads to my power supply and turned on the main power switch.

First, get the armature spinning at the speed you want. Switch the Power Feed's LCD display to the "Arm" setting, which tells you how much voltage the lathe's motor is receiving, and adjust the "Arm rpm" knob until the display reads between 4½ and 5 volts. Next, set the speed at which the Power Feed's motor will move the lathe's carriage. Switch the display so that it reads the "Power Feed," and then adjust the "Feed Rate" knob so that the display reads between 2½ and 3 volts. Here, I prefer that the cutter make a slower pass, so I always set this at 2½ volts.

Your lathe fits atop the Power Feed unit, and a rubber belt connects the carriage pulley to the drive pulley that protrudes from the Power Feed's side.



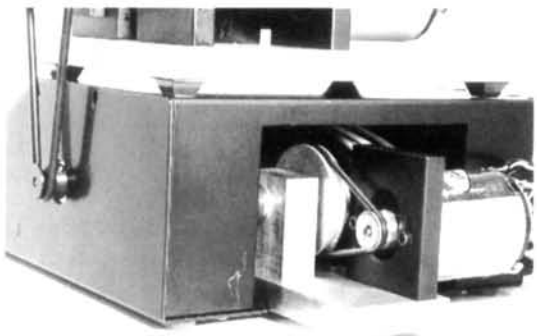
Move the cross-feed until the cutter just makes contact with the comm's surface, then let the Power Feed take over and control the carriage feed.

MAKING THE CUT

Just as you would make a pass with a standard lathe, move the cross-feed until the bit just touches the comm's surface. When you resurface a comm, it's a good idea to use a lubricant. Cobra offers their own comm-cutting fluid (part no. 40002) for this purpose. I tried a light machine oil and the Cobra lube, and I found that the Cobra fluid provided a better finish.

When the cutter has been positioned properly, move the Power Feed's toggle to the left position to begin moving the cutter across the comm. I was amazed at how much better the finish of the cut was with the Power Feed controlling the cutting rate; when you move the handwheel manually, minute inconsistencies show up as small scratches on the finished comm.

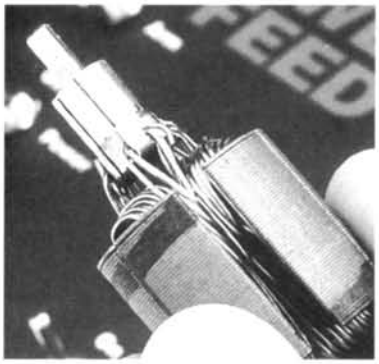
When the initial pass has been completed (be careful not to move the cutter into the armature winding tabs), release the toggle to stop the carriage. Back off the cutting tool a little so that it no longer touches the comm, and slide the toggle into the right-hand position to move the cutter back past the end of the armature to begin another pass (if one is needed).



A stock motor drives the lathe's carriage action. Motor voltage is regulated by the Power Feed, and it's controlled by you.

Power Feed Controls

A. LCD display. This shows the motor voltage of the carriage drive (Power Feed) or lathe-mounted motor.
B. Display switch. Use this to change the display between Power Feed motor voltage and the armature-drive motor voltage.
C. Main power switch.
D. Arm rpm. This sets the voltage of the armature-drive motor.
E. Arm switch. Use this to turn on the armature-drive motor power.
F. Power feed direction. Controls the movement of the carriage feed.
G. Feed rate. Controls the speed at which the carriage moves.



Presto! Your commutator is as good as new. The Power Feed's precise control will net you a perfect finish every time.

FEED THE HUNGRY

Team Cobra is really onto something unique with their new Power Feed. Although it isn't cheap ($249.95 retail, but you already own a comm lathe, so what's a little more money?), this device will most assuredly improve the quality of your commutator resurfacing. The Power Feed also doubles as a variable power source with which you can break in motors or drive slave motors for other applications. If you own a lathe, or if you're considering purchasing one, then the Power Feed is worth a serious look.

** Here's the address of the company that's featured in this article:*
Team Cobra/C&M Mfg.*, P.O. Box 701-353, Nest Valley City, UT 84170; (801) 250-9747.* ■

ADVERTISER INDEX

Ace Hardware....101-103
Aero-Car Technology, Inc....32
Airtronics....4
Alliant Engineering....80
America's Hobby Center....42-43
Associated Electrics....98,104-105,160-161,C3
Aveox....128
B&B Software....154
B&T R/C Products....123
Badd Boyz....65
Badger Airbrush....72
Baracuda....73
Boca Bearing....94
Bold Creations....155
Bolink R/C Cars, Inc....109
BRP Model Racing Products....126
Bruckner Hobbies....66
Byron Originals....162
C&M Team Cobra....57,59,61
Calandra Racing Concepts....123
Cats West....136
Chrome-Tech, USA....48
Class Recreational Products....154
Competition Electronics....113
Competition R/C Imports....128
Dahm's....8
Dencoe Designs....72
Dillon Racing....91
Downtown Hobby....116
DuraTrax....77,135
Elite Speed Products....155
ERI....116
Futaba Corp....50
Hitec....60
Hobby Etc....41
Hobby Products International....14
Hobby Warehouse....118-121
Holeshot Racing Products....155
In-Line Racing....94
K&S....136
Kyosho....C2,79,117,143
Litespeed....23
Lunsford Racing....154
MaxMod Mini Sports....124
Model Rectifier Corporation....C4
Moore's Ideal Products....46
Mugen USA, Ltd....90-91
Nationwide Hobbies....78
New Era Models....91
Novak Electronics....80-81
OFNA Racing....123
Paragon....13
Parma/PSE....82-83,127,155
Perfect Match....94
Plus Co. International....9
Progressive Technologies, Inc....67
Pro-Line USA....27
Protoform....116
Racer's Choice....134
Ranch Pit Stop....95
R.C.C.A. Buyer's Mart....137-140
R/C International....115
R/C Motor Sports of Miami....107
R/C Sports Mania....90
Robinson Racing....52
Robart Mfg....80
RPM....65
Savon Hobbies....124,125
Schumacher....9
Sheldon's Hobbies....130-133
Slimline Manufacturing....9
Southside Hobbys....34
Stealth....48
Stormer Hobbies....156-159
T.D.P. Aerospce Limited....136
Tamiya America, Inc....21,123
Team Losi....51,55,69-69
Team Losi Tech Talk....95
Tekin....114
The Inside Line....155
Thorp Manufacturing, Inc....11
TNR Technical, Inc....88
Top Racing Products....29
Tower Hobbies....144-153
TRC....35
Tree's Racing Products....155
Trick Products....32
Trinity Products....3,16-17,19,33,49,58,85,111
Twister Motors....7
Ultimate Hobbies....126
Victor Engineering....84
World Class Inc....89